Financing Energy Efficiency Improvements for Homes, Commercial Buildings, & Charter Schools

ANAYLYSIS OF OPPORTUNITIES FOR SELF-HELP TO PROMOTE AND FINANCE ENERGY EFFICIENCY

by

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A Masters Project submitted to the faculty
of the University of North Carolina at Chapel Hill
in partial fulfillment of the requirements
for the degree of Master of Regional Planning
in the Department of City and Regional Planning.

Chapel Hill

2006

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EXECUTIVE SUMMARY

FINDINGS

Energy efficiency offers a multitude of benefits to individuals, businesses, and schools, as well as to the greater community. In addition to a strong mission fit, a Self-Help energy efficiency initiative could also benefit the organization directly. Key benefits include:

- Energy cost savings
- Competitive market advantage
- Increased sales
- Increased productivity
- Higher building value
- Healthier buildings
- Improved student performance
- Economic development & job creation
- Improved environmental quality & preservation
- Reduced lending risk
- Appeal to Self-Help investors

While there are a few existing resources and financial incentives for which some borrowers may qualify, there remains a gap in financing options for much of Self-Help's typical client base. Low-income homebuyers, marginal small businesses, and many charter schools have limited options for financing extensive energy improvements, and there is a real opportunity for Self-Help involvement.

Of course, incorporating an energy efficiency initiative into Self-Help's lending programs would not be without challenges. This paper also explores several issues staff should take into account when considering program implementation, such as:

- Accuracy of energy savings predictions
- Appraisal considerations
- Borrower overwhelm
- Loan process delays
- Contractor quality & experience
- Liability questions
- Maintaining accuracy of resources
- Initial contact at varying stages of development process in construction loans
- Limited borrower construction experience
- Administrative costs
- Staff knowledge & training
- Program sustainability

RECOMMENDATIONS

Given the numerous benefits of energy efficiency for all sectors considered, it is recommended that Self-Help implement energy efficiency initiatives in the home mortgage, commercial, and charter school lending sectors. Specific recommendations were developed for each lending team.

Residential

- Develop and maintain a pamphlet on simple home energy saving recommendations
- Develop and maintain a list of resources for home energy improvements, including qualified energy professionals and organizations providing support and technical assistance
- Formalize underwriting criteria and promote a Self-Help energy efficient mortgage (EEM) loan product

- In the long-term, consider the feasibility of an energy improvement loan program

Commercial

- Improve on and maintain existing pamphlet on energy conservation
- Develop and maintain a pamphlet with general energy efficient building recommendations
- Explore possibility of offering free or reduced-price energy audits
- Offer staff educational opportunities

Charter Schools

- Develop and maintain one or more pamphlets on energy efficiency and green building (high performance) recommendations, organized by construction type
- Develop and maintain a pamphlet on how to choose an experienced high performance building design team, including resources for identifying specific professionals
- Improve Self-Help ability to provide high performance design technical assistance by training in-house construction advisors
- Consider the long-term possibility of a specific high performance schools loan product with attractive interest rates or underwriting guidelines
- Boost staff interest in proposed charter school initiative by offering educational opportunities, such as guest speakers and field trips

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INTRODUCTION

In the commercial and residential sectors, energy efficiency improvements allow an individual or business owner to reduce energy consumption without decreasing comfort or productivity. Energy efficiency produces immediate savings on energy consumption, resulting in lower energy bills and freeing up of cash for other purposes. A business of any size or household of any income level can benefit from the financial savings of energy efficiency, but it can offer a particularly important benefit to many low-income households, small businesses, and charter schools that have tight budgets and limited cash flows.

Energy efficiency investments can often be justified on their future energy savings alone. However, it is important to consider the numerous other potential benefits as well. For example, there is a direct and immediate financial benefit to the businesses that provide the energy efficient equipment or make efficiency improvements to buildings. More diffused economic benefits can also accrue to the community as expenditures are redirected away from foreign fossil fuels and into local business. On a large scale, energy efficiency investments are likely to result in a net increase in jobs, due in part to the fact that energy efficiency related industries are more labor intensive than energy production and distribution. Energy efficiency also has a positive impact on air quality as emissions from polluting energy sources such as coal-fired power plants decreases, resulting in healthier communities.

Self-Help is increasingly recognizing the role that energy efficiency can play in supporting its larger goals. Self-Help's mission is to help build the assets of low-wealth individuals and small businesses, and to serve as a pioneer and a model for community-based economic development. The nonprofit organization is pursuing these objectives on a number of fronts. Through its Credit Union and Ventures Fund, Self-Help offers home mortgages and small business loans to individuals and business owners who cannot access financing from traditional sources. The organization also builds affordable housing in distressed neighborhoods, redevelops downtown buildings to stimulate reinvestment and revitalization, and advocates for fair access to credit on behalf of low-income individuals.

Energy is a real issue for Self-Help's client base. Energy costs represent a significantly greater portion of household income for low-income families than for middle-class and wealthy households. Small businesses that are struggling to make ends meet or find the finances needed to grow to the next level could benefit from even a minor decrease in business expenses. Charter schools have limited per pupil funding to cover facility and educational needs, and energy savings could be used for additional books or other learning tools. In addition, there is a growing body of research and recognition that energy efficiency offers building occupants many non-energy benefits, including improved indoor air quality, better lighting, and increased comfort.

Self-Help is starting to address these concerns. In 2004, Self-Help began incorporating SystemVision, an energy efficient building method, into its new affordable homes. SystemVision guarantees low heating and cooling costs, a comfortable and consistent air temperature, and improved indoor air quality through proper ventilation (Lanier Blum 2005a). The result is an improved financial position and a better quality of life for Self-Help's homebuyers.

There is a potential opportunity for Self-Help to make a much larger impact on its clients and communities by expanding its energy efficiency focus into its lending sectors. While Self-Help built a half-dozen energy efficient homes in 2004, the organization provided 426 home mortgages and 245 loans to small businesses and community facilities (Self-Help 2005). Recognizing the possibility for simultaneously improving the welfare of its borrowers and the community's economy and environmental quality, Self-Help is interested in exploring ways to introduce an energy efficiency component to its lending activities. This could range from simply providing "how-to" brochures and contacts to outside resources, to establishing a special lending or technical assistance program.

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This paper is the culmination of research that was begun during a summer internship with Self-Help in 2005. The original directive was to take a preliminary look at issues and opportunities for Self-Help lending divisions (commercial and residential) to help borrowers improve their energy efficiency. The intention of the broad survey of energy trends, efficiency benefits, and existing incentive programs was to identify possible low-hanging fruits that could be the focus of targeted borrower outreach. Initial research findings and staff interest led to a deeper focus on charter schools as an ideal focus for a pilot energy efficiency and green building initiative. Therefore, a more in-depth "case study" of charter school opportunities was completed as well

Chapter 1, "Why Energy Efficiency?," examines the numerous benefits that can result from increased energy efficiency. The section considers direct borrower benefits (for residential, commercial, and charter school consumers); impacts on the larger community, including economic development and environmental conservation benefits; and benefits that Self-Help may experience as a lender.

Chapter 2, "Energy Efficiency & Home Lending," explores issues directly related to Self-Help's residential borrowers. The chapter includes a look at existing financing options and the financing gap that Self-Help could fill. I outline several potential strategies for promoting homebuyer energy efficiency, and conclude with specific short-term recommendations for Self-Help's mortgage lending division.

Chapter 3, "Energy Efficiency & Commercial Borrowers," is structured in much the same way as the "Home Mortgage Borrowers." The focus is on small business, and includes information on commercial energy consumption by business type. This chapter also explores existing financing options and incentives, as well as general recommendations for Self-Help.

Chapter 4, "Case Study: Charter Schools," explores in more depth issues and opportunities in this specific lending niche. I outline a specific strategy for implementing a pilot energy efficiency and green building initiative that will focus on charter school borrowers, which may later be expanded to other areas of Self-Help lending.

Appendix A, "Energy: Supply & Cost," provides an overview of the sources of energy produced and consumed and projections of future energy prices. Energy sources affect the price and volatility of energy purchased by borrowers, and are also related to the environmental impacts of energy consumption. Energy prices are key inputs in measuring financial benefits of conservation and efficiency, and future price expectations are important in estimating long-run returns.

Appendix B, "Energy Efficiency Programs," is a survey of existing non-financial programs offered by state and federal government agencies and utility companies. Many of the programs could be key resources for Self-Help and borrowers.

Appendix C, "Introduction to the Technology," describes many of the energy efficient technologies and strategies that are described throughout the paper.

While Durham-based Self-Help does some lending outside North Carolina, borrowers are heavily concentrated in the state. Energy efficiency issues vary by state and region due to differences in climate, energy sources, state and local efficiency programs, and other variables. For simplicity, this paper focuses primarily on North Carolina.

Energy efficiency can take a number of forms and represents a wide range of cost and complexity: from compact florescent light bulbs to whole building control systems; from energy efficient computers to fuel-efficient vehicles. This paper focuses on cost-effective energy efficiency for homes and businesses, with a particular focus on energy efficient building structures and systems (such as heating, air conditioning, and lighting). Both improvements to existing buildings and energy efficient new construction are considered. While appliances, equipment, and occupant energy management choices are also important components of total energy costs, they will be a secondary focus. "Cost-effective" in this paper is defined as an improvement whose upfront costs will be paid for in energy savings within the improvement's expected useful life.

CHAPTER 1

WHY ENERGY EFFICIENCY?

This section will explore a range of individual and social benefits of energy efficiency that are well-aligned with Self-Help's mission of building the assets of low-income individuals and communities. Increased energy efficiency of Self-Help's borrowers could simultaneously reduce the organization's lending risk, improve borrowers' financial situations, and strengthen communities.

BORROWER BENEFITS

There are numerous benefits that could accrue directly to Self-Help borrowers as a result of increased energy efficiency, including a stronger financial position and improved occupant health and productivity.

Energy Savings

While projections of energy cost savings an individual or business will experience as a result of an energy efficiency investment are not always simple or straightforward, they are usually quantifiable. Professional energy auditors can evaluate existing buildings, recommend specific energy efficiency improvements, and place a specific energy cost savings estimate on proposed improvements. Even if the savings are not accurately predicted in advance, they can be measured in the future so long as other variables can be controlled (such as changes in climate or in building use).

Energy costs are a significant household expenditure and disproportionately burden low-income households, as shown in the table below.

Table 1.1: Energy Expenditures As Percentage of Household Income

Household Income	***Energy Costs***
Under $10,000	10%+
$10,000 - $29,999	4.2%
$30,000 - $49,000	2.9%

Source: EIA 2003.

The U.S. Environmental Protection Agency estimates that household energy efficiency (including use of energy efficient products) could reduce average energy costs by 25 to 30% (EPA 2003, p. 3). This can add up to several hundred dollars in annual savings for low-income homeowners, freeing up income for other household expenditures.

The energy cost savings that a resident could expect from an efficiency upgrade depends on the house, type of improvements made, energy fuel sources and price, local weather, and indoor temperature preference. As there is no "typical" house, there are also no typical energy savings. However, improvements completed by the federal low-income Weatherization Assistance Program

saved recipients nationwide an average of $274 per year (D&I International 2005). When looking at national averages, it is important to consider that energy costs and efficiency savings will vary by location. Average costs and savings for North Carolina homes may be below the national average because of the state's relatively mild climate.

The potential energy savings from improved efficiency will fluctuate along with energy costs. The cost of energy increased dramatically as a result of Hurricane Katrina damage and supply disruption. The impact on heating prices this winter was expected to be severe. In the South, natural gas price increases were projected to be the most significant – homes heated primarily with gas expecting an average increase in heating cost of more than 44% (a $295 increase for the average home) (EIA 2005c). Oil-heated homes were projected to experience a 30% increase ($198), a 21% greater cost for homes that rely on propane ($196), and an average of 8% (or $55) for electric heated homes. While long-term projections indicate that prices will begin to decline in a few years (see **Appendix A**) the recent spikes demonstrated a severe impact on households and illustrated the dramatic difference energy efficiency could have on household budgets.

It is much harder to estimate "average" energy savings for commercial energy efficiency improvements because of the multitude of different variables, such as business type, energy needs and uses, and existing building type and quality. However, every business has opportunities to improve efficiency, and some have very large savings potential. A business may use its energy savings in a number of ways, including reinvesting in the business, boosting the financial strength of the business by increasing cash reserves, or increasing the profit margin for business owners and investors. The reduction in expenses could also be used to reduce prices of products and services, increasing its competitiveness and passing savings along to its customers. From Self-Help's perspective, this extra cash flow cushion could increase confidence in loan repayment ability.

Competitive Market Advantage

A business can take advantage of an energy efficient building to position itself as a "green" business. TS Designs, a screenprinter and apparel manufacturer in Burlington, North Carolina, has worked hard to green its facilities, in keeping with its corporate mission of sustainability. TS Designs now has a photovoltaic panel on site that provides power to its computers and other communications equipment, motion sensors for lighting, more efficient lighting and other equipment, and task specific lighting and cooling in its manufacturing plant (Henry 2005).

Even businesses that do not provide green products or have a specific sustainability mission could benefit from promoting an energy efficient building. The supermarket chain Food Lion has invested in store energy efficiency. Of the company's 1,300 stores, 400 have already received ENERGY STAR certification, with plans to certify 200 more in 2006 (Food Lion No date).[1] As a result of its dedication to energy efficiency, the chain has received ENERGY STAR awards for five consecutive years, as well as recognition from other environmental and energy organizations (Food Lion No date). The EPA/ENERGY STAR recognition offers Food Lion a PR opportunity—the company has received a lot of press for its EPA awards, and includes a full page on its website about its ENERGY STAR partnership and statistics on annual energy saved. This provides an advantage in the very competitive grocery industry, and could have a positive impact on sales and cash flows.

[1] In fact, of the 195 ENERGY STAR-certified buildings in North Carolina listed on the ENERGY STAR website as of March 2006, over 170 were owned or managed by Food Lion.

A school's facilities can be a real source of pride, and green or energy efficient buildings can offer the school (and the school district) a positive image in the community (Fuguet 2005). Particularly for charter schools whose success is determined in part by meeting enrollment goals, this positive perception could be helpful in attracting students, particularly if the benefits to the students of learning in such a setting are communicated to parents. To the extent that green school buildings are more visually attractive, aesthetics may be a source of recognition as well.

Increased Sales

Research indicates that the presence of daylight in retail buildings can have a positive impact on sales. One study found that a retail chain experienced sales 40% greater in its stores with skylights than those without (Peet, Heschong, Wright & Aumann 2004, 7-272). A later study of a retail chain in a different sector found much more modest increases in sales of 1% to 6% attributable to the presence of daylight (Peet et. al. 2004, 7-280). Whether minor or dramatic, these sales benefits are on top of the often substantial energy savings that result from daylighting.

Increased Productivity

A report by the Rocky Mountain Institute (RMI) claims that for businesses, "Efficient design practices are cost-effective just from their energy savings; the resulting productivity gains make them indispensable" (Romm & Browning 1998, p. 1). Because labor represents a much higher cost than energy (an average of 72 times more), "an increase of 1 percent in productivity can nearly offset a company's entire annual energy cost" (Romm and Browning 1998, p. 3).

The RMI report profiled eight companies that not only saw energy savings result from a retrofit or construction of a new building with improved heating, cooling and lighting, but also saw a drop in absenteeism, an increase in employee productivity, and a decline in errors and manufacturing defects. Most of the efficiency improvements would have paid for themselves in energy savings within a few years, but combined with the financial benefits of the productivity increases, paybacks were typically less than one year.

While the productivity gains for the businesses profiled by RMI were for the most part unexpected, there is an increasing recognition in the real estate field that employees are more productive in an energy efficient building. Results of a survey of 140 building owners, developers, architects, and engineers in Wisconsin found that 56% (including 61% of building owners) perceive that an energy efficient building has a positive impact on worker productivity (Bicknell and Skumatz 2004).

Beyond sole energy concerns, VeriFone saw absenteeism drop 40% and productivity increase over 5% after making indoor air quality improvements (Kats 2003 p. 56). PNC Realty Services has seen dramatic drops in voluntary terminations (83% in one business unit), in addition to decreased absenteeism and improved productivity and recruitment, after moving into a LEED Silver[2] certified building (Kats 2003, p. 56). Twenty percent of Illinois teachers at several schools studied averaged four sick days annually as a result of indoor air quality issues (Kats 2003 p. 70).

[2] LEED stands for Leadership in Energy and Environmental Design. It is a widely used green building certification program, established and run by the U.S. Green Building Council.

Home Appraisal

A 1998 study published in *The Appraisal Journal* found that home values in the 1990s increased by about $20 for every one dollar increase in annual energy savings (Nevin and Watson 1998). Older studies showed value increases between $11 and $21. The researchers of the 1998 study assumed "stable fuel price expectations," and it is possible that with the dramatic increases in fuel costs this year homebuyers and other real estate market participants are much more cognitive of the long-term financial value of energy efficient homes. In addition, consumer consciousness of the environmental impacts of purchasing decisions is increasing. Heightened environmental sensitivity could also increase the value of energy efficient homes.

A word of caution. Despite evidence that energy efficient buildings can command a price premium, the value of energy efficiency is not yet universally understood by appraisers, real estate agents, and buyers. Value attributed to energy efficiency may vary based on locality and housing submarket. Even where efficiency market value is high, it may not be officially recognized by appraisers, which poses mortgage underwriting problems and may prevent borrowers from obtaining attractive financing. In addition, there is very little information on energy efficiency in relation to commercial building value.

Healthy Buildings

Energy efficient buildings may be healthier buildings. Some low-income homeowners will be able to heat and cool their house to a more comfortable, and healthier, temperature as it becomes more affordable as a result of efficiency improvements. Studies have found that "people living in houses with sufficient and continuous heat during the colder months of the year are likely to get fewer colds" (Schweitzer and Tonn 2002, 15). This has both a quality of life and a financial implication – fewer colds means fewer days of missed work and more consistent paychecks.

Energy efficiency upgrades offer health benefits beyond comfortable temperatures. Better-quality heating systems reduce the risk of faulty furnaces that can release carbon monoxide, which poses a serious health threat to occupants (Schweitzer and Tonn 2002, 16). Properly designed ventilation systems send steam outside, reducing humidity within the building and the chance that molds or other allergens will develop. A comprehensive weatherization or energy efficiency upgrade typically addresses building "tightness" and considerations of fresh air and carbon dioxide levels. Finally, improvements such as increased insulation and efficient windows can decrease temperature variation throughout the building.

Daylit buildings may be healthier for students. One study of Swedish elementary school students found that working in classrooms without daylight affected their "basic hormone pattern," which could influence students' concentration and ability to cooperate, even potentially impacting physical growth (Plympton et. al. 2000, p. 1). A separate study found that students in classrooms lit with full-spectrum lights were absent less than those lit with conventional lighting (Plympton et. al. 2000).

Indoor air quality is also affected by non-energy-related building components such as carpets and paints, which can release toxic chemicals in the air. Although these do not typically see a financial payback (unless useful life is much longer, lowering replacement costs), the health benefits can be significant and should be considered when feasible, particularly for homes and schools where children could be at great risk. Improvements in indoor environmental quality reduces respiratory

illness, allergies, asthma, and sick building syndrome symptoms (Kats 2003). Student attendance in two Illinois schools increased by 5% after implementing "cost effective indoor air quality improvements" (Kats 2003, p. 70), indicating that students may have taken sick days as a result of illness caused or exacerbated by school air quality. Health benefits may translate into indirect financial benefits as a result of reduced healthcare costs, fewer missed days of work, and increased employee productivity.

Academic Performance & Educational Value

Several studies have found that daylighting has a positive affect on student academic performance. Two large studies determined that students attending schools with the most daylighting in a district outperformed students attending schools with the least daylighting by 5 to 18% (Plympton, Conway, & Epstein 2000). Although the economic impact may be difficult to quantify, improved student performance can result in both short- and long-term benefits to the community. Daylighting in schools is discussed in more detail in the **Chapter 4**.

"Green" or energy efficient technologies in school buildings can be incorporated into the curriculum, providing unique, hands-on education around energy issues. North Carolina policymakers recognize this potential:

> The Energy Policy Council strongly recommends that students should be exposed to working energy technologies in their school buildings. Daylit rooms, state-of-the-art heating and cooling systems, solar water and space heating devices, renewable electricity systems, and a variety of innovative energy efficient construction products are examples of the technologies that are important to install in school buildings throughout the state (SEO & ASUEC 2005, p. 69).

COMMUNITY IMPACTS

Economic Development

Energy efficiency spending has a much greater economic impact on communities than spending on conventional energy sources. Almost all of the state's energy resources (namely fossil fuels) come from outside the state, and national dependence on foreign oil is growing (SEO & ACUEC 2005). Energy efficiency helps patch these leaks in the economy, supporting more local jobs and producing other economic benefits to the community.

<u>Economic Multiplier</u>
The multiplier effect refers to the cumulative economic impact on the community for every dollar spent—for example, to businesses that support the organization that received the original dollar. In Osage, Iowa, one dollar spent on "ordinary consumer goods in a local store" has a multiplier of $1.90 (DOE 1996, p. 2). In the energy sector, energy efficiency is more labor intensive and captures more dollars locally than money spent on utilities. The U. S. Department of Energy (DOE) estimated a multiplier of $2.23 for energy efficiency, in comparison to $1.66 for utility services (DOE 1996, p. 2).

The economic multiplier includes three subcomponents that measure direct, indirect, and induced effects. Direct multipliers include change in output, employee compensation, and employment in the industry. In the energy efficiency industry, *direct* effects include the impact on the vendors, installers,

energy auditors, and others who directly participate in energy efficiency improvements, receiving additional revenue, hiring new employees, and raising wages to keep up with increased demand for their services. The vendors and installers in turn spend additional money with other local businesses such as their accountants and suppliers, who may also create new jobs as a result of increased energy efficiency efforts—these are the *indirect* effects of energy efficiency.

In addition, there is the further economic impact that results from the *induced* multiplier effects – energy savings increase household and business discretionary income, which is spent on non-energy goods and services. This would also include increased individual discretionary income as a result of job creation or increased wages. The DOE has found that "energy dollar savings accrue primarily to members of the local community. In fact, it is the spending of energy dollar savings that can translate into substantial economic benefits, possibly greater in magnitude than the initial investments in energy efficiency improvements" (DOE 1996, p. 3).

Imbierowicz and Skumatz (2004) estimated multipliers for an energy efficiency program.[3] They found that for every $1 million invested in repair and maintenance, there would be a $1,799,000 increase in total output (a multiplier of 1.799). In addition, the model showed a $755,000 increase in labor income. Because the positive impact on these sectors is greater than the simultaneous reduction of expenditures on electric utilities, there is still a net economic benefit of energy efficiency even after the loss to the utility sector is accounted for. Imbierowicz and Skumatz demonstrated that the net total output would still increase by $492,000 and labor income would increase by $435,000. They estimated that this would be a multiple of 15-40% of the total energy bill savings.

Job Creation

One component of the economic multiplier is employment impact. Imbierowicz and Skumatz (2004) found that a $1 million investment in energy efficiency retrofits would generate about 21 jobs. The electric utility sector would lose only five jobs, resulting in a net gain of 16 jobs. They note that the net increase is due to the fact that the repair and maintenance sectors are "clearly more labor-intensive than the electricity generation sector" (Imbierowicz and Skumatz 2004, p. 8-161).

Others have also found that increased energy efficiency efforts would result in a net employment gain. The three studies summarized in **Table 1.2** are much broader than the residential and commercial building sector that is the primary focus of this paper – they look at an increase in energy efficiency in all segments of the economy, including more efficient vehicles, appliances, and industrial processes. However, they offer further evidence that an energy efficient economy is a stronger economy.

[3] The researchers were attempting to estimate effects of a low-income home weatherization program; they modeled increases in expenditures in the maintenance and repair sectors and decreases in the electricity generation sector. The researchers note the limitations of their focus on only repair and maintenance, and caution that these multipliers may not be applicable to new construction (Imbierowicz and Skumatz 2004). The model is also specifically focused around electric-dependent households and the impact of efficiency on the electricity-generation sector. Multipliers will vary by location depending on a number of factors, including climate, energy intensity, share of energy produced by electricity, and local electricity production.

Table 1.2: Job Creation, Energy-Efficient Economy Scenarios

Study	*Employment Increase*	*Other Benefits*
"Smarter, Cleaner, Stronger" plan, Redefining Progress, 2004	44,000 N.C. and 1.4 million U.S. by 2025	$1,500 energy savings per household N.C. and $1,275 U.S.
"Climate Protection Scenario," World Wildlife Fund, 2001	39,000 N.C. and 1.3 million U.S. by 2020	$51.4 billion increase in wage and salary compensation by 2020
"High-Efficiency Scenario," American Council for an Energy-Efficient Economy, 1992	1.1 million U.S. by 2010 (0.7% increase)	20% less energy consumption overall; 0.5% increase in personal income

Source: Hoerner and Barrett 2004; Redefining Progress 2004; Bailie et. al. 2001; Geller et. al. 1992.

Geller et. al note that in their High-Efficiency Scenario, "The positive employment and income results are due primarily to the relatively low labor intensity of the energy sectors (coal, oil and gas extraction, fuel refining, and electric and gas utilities) compared to the economy as a whole" (Geller et. al. 1992). Dollars are shifted to more labor-intensive sectors of the economy, including non-energy efficiency related industries. Most benefits are a result of induced effects: "less than 10% of the net jobs created are associated with direct investment in efficiency measures while more than 90% are associated with energy bill savings and respending of those savings" (Geller et. al. 1992).

Table 1.3 shows the industries that will see some of the largest net job gains in the energy efficiency scenarios projected by Bailie et. al. and Geller et. al. Of course, not all sectors of the economy would benefit from increased energy efficiency. The explicit intention of such an initiative is to spend *less* money on energy, which necessarily would have a negative impact on energy-related sectors. The table also lists employment sectors that would see a decrease in total jobs.

Table 1.3: Projected Employment Changes by Sector Resulting from Increases in National Energy Efficiency

Employment Sector	*Bailie et. al.*	*Geller et. al.*
Services	394,600	383,578[4]
Construction	340,300	342,101
Retail	190,300	197,491
General Manufacturing	77,900	72,824
Oil & Gas Mining	(61,400)	(139,080)
Electric Utilities	(35,100)	(177,744)
Natural Gas Utilities	(26,200)	(71,090)
Coal Mining	(23,900)	(20,300)
Oil Refining	(6,300)	(8,095)

Source: Bailie et. al. 2001 and Geller et. al. 1992.

Clean Energy Durham has a workforce development component to its campaign to encourage more Durham households to install solar hot water heaters. Its report "A Durham Campaign for Solar Jobs" claims that each 100 residential installations will support three-full time jobs for a year, which pay $15 per hour within the first 12 months (Kincaid 2006). These are just the installer jobs created locally, and do not include increases in manufacturing employment.

[4] Bailie et. al. use one lump "Services" category; for Geller et. al., this number includes a smaller "Services" category as well as employment increases listed in separate services categories (restaurants, health services, and hotels & lodging).

Environmental Quality & Preservation

Environmental quality is important for the health and well being of individuals and communities. In both 2001 and 2002, North Carolina was ranked sixth nationally in the number of annual smog days (SEO & ASUEC 2005, p. 14). Ozone triggered 240,000 asthma attacks in North Carolina in 1998 (SEO & ASUEC 2005, p. 14). EPA consultants estimate that power plant pollution alone is blamed for an estimated 1,133 deaths, 1,013 hospitalizations, 27,418 asthma attacks, and 158,431 lost workdays in the state each year (Clear the Air, No date (based on 2004 report by Abt Associates). Power plants are also responsible for much of the mercury pollution in the state's water and air, which poses very serious heath risks, particularly to babies and young children.

These health issues affect all North Carolinians. However, low-income communities have historically been disproportionately impacted by air pollution and environmental toxins. Low-income and communities of color (particularly African American communities) experience much higher rates of childhood asthma than the country as a whole (Children's Defense Fund 2004), likely a combination of both indoor and outdoor air quality issues.

Although North Carolina enacted the "Clean Smokestacks Bill" in 2002, placing a cap on emissions of nitrogen oxide and sulfur dioxide from coal-fired power plants, carbon dioxide emissions are expected to continue to rise. The State Energy Plan acknowledges, "The only viable options at present for reducing CO_2 emissions appear to be increasing efficiency and switching to energy sources that generate considerable less CO_2" (SEO & ASUEC 2005, p. 15). In addition to reducing pollutants released by electricity-generation plants, energy efficiency would reduce direct emissions from homes and businesses that rely on natural gas or other fossil fuels to generate some of their energy needs. Imbierowicz and Skumatz (2004) estimated that a national low-income weatherization program could conservatively expect environmental benefits equivalent to 20-50% of energy bill savings (p. 8-165).

DIRECT BENEFIT TO SELF-HELP

Reduced Lending Risk

Lower energy use decreases the risk of delinquency on loan payments when utility bills spike as a result of severe weather or a sharp rise in energy prices. A study of low-income Iowans found that one-tenth (including both renters and homeowners) could not make their housing payments if they paid their winter heating bills (Mercier Associates 2000). While the winter weather in Iowa is more severe than in North Carolina, an unexpectedly cold month or a dramatic rise in heating costs could have an impact on the ability of some borrowers to make their mortgage payments. For home lending, savings would provide the homebuyer greater ability to stay on top of mortgage payments. This could also be true for some energy-intensive and tight-margin businesses. In addition, energy savings can increase the financial strength of the business by increasing profit margin, business reinvestment, or cash reserves. Improved efficiency or green building features may also increase the value of Self-Help's collateral, lowering loan-to-value ratios. Property may be easier to sell or lease in the case of default.

Appealing to Investors

An energy efficiency lending program would assist Self-Help in promoting itself as an environmentally-conscious organization. It may help in marketing Self-Help's existing environmental certificates of deposit (CDs), as well as in attracting larger investors and partners. New investments would increase the quantity and magnitude of environmental loans that could be reported to funders, partners, and the community. "Triple-bottom line" (TBL) investing, which balances social, economic, and environmental goals, is a growing trend in the financial world. In fact, a group of Community Development Financial Institution (CDFI) leaders recently established a CDFI Triple-Bottom Line Collaborative. For Self-Help to remain competitive as an investment institution and a model in community development lending, the organization should aggressively pursue and market new environmental angles to its services. Self-Help is part of the TBL Collaborative, and could utilize this venue to market new initiatives and share lessons learned with other practitioners.

CHAPTER 2

ENERGY EFFICIENCY & HOME LENDING

This chapter explores options for Self-Help to incorporate energy efficiency into its existing home lending program. Two types of borrowers could be incorporated into a Self-Help home energy initiative. The first includes households that are looking to purchase or refinance an existing home that is not energy efficient. The second set are homebuyers interested in purchasing a new or existing home that was built or upgraded as energy efficient by the builder or another third party.

Upgrading an Existing Home

Energy efficiency improvements to existing homes can take a number of forms, including: modifications to the building shell such as increased insulation, sealing ducts, or installing double pane windows; installation of energy efficiency heating, ventilation, and air conditioning (HVAC) systems or appliances; or renewable energy such as solar hot water heaters. Attention is focused on improvements that reduce energy needed to heat and cool a home because of the large share of total cost that these uses represent and the potentially significant benefits of efficiency upgrades. Nationally, more than 50% of energy consumed in the residential sector is used for space heating and cooling (Pimentel et. al. 2004). Much of this heating and cooling energy (between 20% and 40%) is lost through building leaks. Most homes are under-insulated, with up to 22% lacking wall insulation. Windows are another source of inefficiency, leaking 25% of heating and cooling energy. Luckily, many of these problems can be fixed relatively easily and affordably. Caulking, weather-striping, and other similar improvements can reduce leakage up to 50% (Pimentel et. al 2004).

Purchasing an Energy Efficient Home

While this paper often refers to the benefits of "energy efficiency improvements," implying an upgrade of an existing home, it is assumed that similar benefits would accrue to a household moving from a standard home to an energy efficient home. For example, households that purchase Self-Help's homes built with the SystemVision energy efficiency guarantee see a reduction in heating and cooling costs of 30-50% (Katz 2004). For individuals looking to purchase a home, there are several programs that certify homes as energy efficient.

ENERGY STAR

New homes that are 30% more efficient than those built to the Model Energy Code qualify for the ENERGY STAR label. The label has wide acceptance and recognition in the field and is often used as a standard for private and local government energy efficiency programs—for example, North Carolina's proposed Energy Efficient Homes income tax credit would use ENERGY STAR as one of the energy efficiency standards to determine eligible homes. Builders are increasingly recognizing that there is a market for energy-efficient homes—ENERGY STAR had 2,000 building partners in 2003, including the nation's ten largest builders (EPA 2004). Over 200,000 homes were ENERGY STAR-labeled at the end of 2003, and the EPA estimates $60 million each year in energy savings as a result (EPA 2004).

N.C. Healthy Built Homes

The North Carolina HealthyBuilt Homes Program (HBH) is administered by the N.C. Solar Center. HBH certification has a broader green building focus than ENERGY STAR or SystemVision. However, the HBH certification places a high value on energy efficiency, recognizing both the benefit to the homebuyer in terms of operating costs and comfort and the environmental benefits of reduced pollution and resource consumption. In fact, HBH requires that buildings be ENERGY STAR certified. One of the early HealthyBuilt homes in Chatham County house is 65% more energy efficient than a home built according to the North Carolina Building Code (NCSC 2005). HBH Director Donna Stankus notes that it is possible to achieve this standard at minimal or no additional cost, depending on what materials and strategies are incorporated into the building (Vinegar 2005).

HBH is reaching the affordable housing sector. The Durham Community Land Trustees (DCLT) is "committed to meeting the Healthy Built Homes Certification criteria in all of its residential projects" (DCLT 2005). In June DCLT broke ground on Pauli Murray Place, an affordable housing development that will include homes built to the highest HBH certification level (HBH 2005). Energy efficient components will include passive solar design, solar hot water heating systems, and energy efficient appliances, projected to result in an energy bill savings of 60% for future homeowners (HBH 2005).

SystemVision

SystemVision is an initiative of Advanced Energy, a Raleigh-based energy research organization. SystemVision is a building method that guarantees low heating and cooling costs for homeowners, typically reducing costs 30-50% below average. Advanced Energy offers a two year guarantee to SystemVision homebuyers that heating and cooling costs will remain at or below a specific low monthly cost as long as they follow basic guidelines (Advanced Energy 2005). Homeowners are also guaranteed a comfortable home – that indoor temperatures will not vary by more than three degrees Fahrenheit from the thermostat to the center of a room. The North Carolina Housing Finance Agency (NCHFA) offers a grant of $5,000 per home to some qualified affordable housing developers when they incorporate SystemVision into their houses (NCHFA No date). Self-Help began using SystemVision in its affordable housing development in 2004 and has been pleased with the results, planning to incorporate it into all future homes as long as the NCHFA subsidizes the added costs (Blum 2005).

FUNDING: EXISTING OPTIONS AND FINANCING GAP

Self-Help's role as a nonprofit CDFI is to fill gaps in existing available financing, by making loans available to populations that otherwise would not be served. As such, it is important to explore existing funding sources for energy efficiency and to what extent they may be available to potential Self-Help borrowers. In addition to the financial incentives and resources described below, there are several non-financial energy efficiency programs offered by the state and federal governments and utility companies, described in **Appendix B**.

Cash & Credit Cards

Depending on the financial position of the homeowner or tenant and the cost of the energy efficiency improvement, some individuals may choose to pay with cash or personal credit cards. This may be particularly true of new appliances or equipment. However, a large percent of Self-Help's

client base is unlikely to be able to afford to pay for more than the most minor energy efficiency improvements out of pocket. For larger projects, they will need assistance in the form of grants or loans.

Energy Efficient Mortgages (EEMs)

Energy efficient homes or improvements usually increase the cost of a home. However, standard mortgage underwriting criteria do not account for utility costs when estimating monthly utility expenses. Because of this, "the cost of energy-efficient upgrades for a new home can increase the home buyer's monthly [housing expenses] beyond the qualifying constraints, even when the savings in monthly fuel bills more than offsets the higher mortgage interest" (Nevin and Watson 1998, p. 402). Fortunately, there are a variety of special mortgage programs available for individuals interested in purchasing an energy efficient home or to make energy efficiency improvements.

Fannie Mae EEM

The Federal National Mortgage Association (Fannie Mae) is a secondary market intermediary, purchasing mortgages from lenders to free up their funds and then selling the mortgages to investors. Loans purchased by Fannie Mae must follow specific guidelines, and the congressionally-chartered private company has a significant impact on the type of loans that are made to homebuyers. The maximum loan-to-value for a home that is already energy efficient is 100%, with a combined loan-to-value of 105% (Fannie Mae 2005a). New homes must be labeled energy efficient by professional energy raters or meet other standards such as ENERGY STAR. An EEM can finance 100% of energy efficient improvements, up to 15% of the homes' value for existing homes and 5% for new homes.

Fannie Mae's EEM can be combined with most of its other mortgage products for single-unit owner-occupied homes. For lower-income borrowers, EEMs can be combined with Fannie Mae's MyCommunityMortgage, a product that only requires a $500 borrower contribution and other loan flexibilities (Fannie Mae 2005a). However, Fannie Mae lenders must be approved to offer EEMs before they can provide them to their borrowers.

Freddie Mac EEM

The Federal Home Loan Mortgage Corporation (Freddie Mac) functions as a secondary market intermediary like Fannie Mae and has established its own criteria for EEMs. Freddie Mac's EEM appears to be somewhat more flexible than Fannie Mae – it allows a greater variety of energy ratings methods and gives discretion to the lender as to how much the income ratio can be stretched based on expected energy savings (the lenders do have to document and justify their process for doing so) (Freddie Mac 2005). However, Freddie Mac does not explicitly allow for increasing the loan-to-value as a result of energy efficiency.

Federal Housing Administration (FHA) EEM

U.S. Department of Housing and Urban Development (HUD) FHA-insured mortgages are available to all credit-worthy homebuyers, although it has maximum loan limits by geographic area. Designed for first-time homebuyers, FHA mortgages have a minimum downpayment requirement of only 3%, and closing costs and other fees can be included in the mortgage. Individuals acquiring an FHA loan either to purchase or refinance a home can incorporate the costs of energy efficient improvements into the mortgage, at a maximum of the greater of $4,000 or 5% of the property value (up to $8,000). The total mortgage amount can exceed the area's FHA mortgage limit by the amount of the

efficiency improvements. The EEM does not require an additional downpayment or new requalification processes or appraisals. The FHA allows a 2% "stretch" on the borrower's debt-to-income ratio. Cost estimates and anticipated savings for improvements must be conducted by a home energy rating system program or an energy consultant, and up to $200 of the home energy rating cost can also be financed through the EEM.

Borrowers who want to make energy improvements to an existing home can combine the EEM with the FHA Section 203(k) rehabilitation mortgage insurance program. This program is designed for homebuyers or existing homeowners who want to incorporate the purchase or refinancing of the home and major improvements into one loan. Energy efficiency improvements are eligible, with a minimum improvements cost of $5,000.

Veterans Affairs (VA) EEM

The U.S. Department of Veterans Affairs provides loan guarantees for military veterans and qualified reservists. The VA EEM program allows borrowers to increase their loan amount to cover energy efficiency improvements by up to $3,000 based on documented improvement costs or $6,000 if the increase in mortgage payments will be offset by anticipated reduction of energy costs (greater amounts may be approved with VA approval).

Grants & Tax Credits

Weatherization Assistance Program

The Weatherization Assistance Program (WAP) is funded by the federal Department of Energy (DOE). It was started in 1976 and, according to the DOE, it had weatherized 5 million homes by 2001 (DOE 2005b). Funds are funneled to Community Action Agencies through the states. In North Carolina, the Office of Economic Opportunity (OEO) (in the Department of Health and Human Services) distributes the funds to 33 local agencies. In North Carolina, recipients must be at or below 150% of the poverty level, with preference given to the elderly and disabled. Individuals with certain disabilities, receiving SSI, or recipients of Temporary Assistance for Needy Families (TANF) may qualify as well (Taylor 2005). The state's annual WAP budget is $10 million, with which it serves about 3,500 households each year (OEO 2005). The distribution of funds by agency is based on the poverty level of the county or counties served by each agency, with the counties with greatest poverty levels receiving more funding. While renters are eligible for the program, only 11% of people served in 2001 did not own their home or mobile home (NCCAA 2002).

Eligible clients receive an audit from their local WAP agency to identify possible energy, health, and safety improvements, with the primary goal to reduce household energy costs. The agency and private contractors then perform some of the most-needed weatherization improvements as identified by the audit, such as air sealing; insulation; heating system upgrade; and installation of energy-saving features such as low-flow shower heads and compact florescent light bulbs (OEO 2005 and Taylor 2005). While there is not a maximum amount the local agency can spend per household, the state sets an average per household of $2,700. Nationwide, the weatherization program saves households 15-34% on energy costs, an annual average of $274 per household (D&I International 2005).

Renewable Energy Tax Credits

North Carolina offers a generous tax credit to individuals (and businesses) who invest in renewable energy. The installation of a range of renewable energy installations qualifies the buyer for a tax

credit equal to 35% of purchase, installation, and related costs. For homeowners, there are different credit ceilings for residential technologies: $10,500 for photovoltaic (solar-electric) systems, $3,500 for passive and active solar space heating, and $1,400 for solar hot water heating systems (DSIRE 2005).

In addition, there is a new federal tax credit for residential photovoltaic, solar hot water heating, and fuel cells that was enacted as part of the Energy Policy Act of 2005. This tax credit allows homeowners to claim tax credits on new solar installations of up to 30% of total costs, capped at $2,000 for photovoltaics and solar hot water and $0.50 per kilowatthour for fuel cells (DSIRE 2005).

Not all renewable energy technologies are cost-effective. Photovoltaic systems in particular rarely pay for themselves in energy savings. For some homeowners, however, solar hot water or space heating may be cost-effective, particularly when combined with these tax credits.

Energy Efficient Homes Tax Credit

There is currently legislation in the N.C. General Assembly (H445 and S190) that would establish tax credits for builders and purchasers of energy efficient homes. The amount of credit would be determined by whether the homes are new or remodeled and whether federally-certified (through ENERGY STAR) or state-certified (through the N.C. HealthyBuilt Homes Program) as energy efficient. A taxpayer who builds or manufactures a new federally-certified home would be eligible for a $500 credit, or $1,500 if state-certified (NC General Assembly 2005). For remodeled homes, the credit would be $1,000 for federally-certified and $2,000 if state-certified. Purchasers of a home that is either federally- or state-certified would be eligible for a $500 tax credit. A taxpayer cannot receive a credit for both building/remodeling and purchasing a home.

If the credit is approved, energy efficient homes could become more affordable. Homebuilders may reduce the price of a newly constructed or remodeled home due to the tax credit, and homebuyers would receive a direct discount of up to $1,500. If passed, Self-Help should consider how this tax credit could provide additional underwriting flexibility for borrowers purchasing a qualified home.

Financing Gap

Self-Help specializes serving borrowers that do not qualify for traditional "conforming" loans that are sold to Fannie Mae and Freddie Mac. Individuals that Self-Help may serve that would not qualify for a conforming loan include those with recent credit delinquencies or bankruptcy, recent job changes, non-qualifying home types, or unconventional sources of income (Self-Help 2001). Because of the targeted client base, the existing Energy Efficient Mortgage (EEM) programs for the most part will not be available to potential Self-Help borrowers. Self-Help does offer Fannie Mae, FHA and USDA[5] -conforming loans, yet between January and July 2005 only seven of the 244 mortgages closed since the beginning of the year utilized these programs (less than 3%) (Dancy 2005).

Even for the few potential borrowers who could qualify for a conventional loan, the EEMs may not be readily available. As of July 2005, only Wachovia and Countrywide Home Loans offered Fannie Mae EEMs in North Carolina (Fannie Mae 2005b). Self-Help has not been approved to make EEMs under Fannie Mae guidelines, and given the few qualified borrowers it does not necessarily make

[5] Self-Help participates in a mortgage guarantee program offered by the U.S. Department of Agriculture (USDA). The program provides Self-Help with a 90% guarantee on qualified mortgages made to households in rural areas.

sense for the organization to try and do so. Although Freddie Mac lenders do not need advance permission to offer EEMs, a Freddie Mac underwriter admits the special energy guidelines are very rarely used (Meister 2005).

While conventional energy efficient mortgages are out of reach for many of Self-Help's low-income clients, most are likely too well off to qualify for the Weatherization Assistance Program. More than 80% of households that receive weatherization grants through the North Carolina Office of Economic Opportunity have incomes of less than $15,000 per year (OEO 2005). In contrast, the average income of households that received Self-Help mortgages in 2004 was $36,528 (Self-Help 2004). The tax credits of course are available to households of any income.

Clearly, there is a gap in the availability of special funding for home energy efficiency, between mainstream conventional EEMs and weatherization grants for very low-income households. Self-Help's client base has few if any other alternatives for general home mortgages as well as special energy efficiency financing. Given the numerous benefits of energy efficiency, Self-Help should consider the feasibility of offering assistance to its borrowers that would like to purchase an energy efficient home or upgrade an existing home. The organization is not in the business of competing for clients and notifies loan applicants when they may receive a better interest rate with a traditional lender. Loan officers should obtain a basic familiarity with conventional EEMs offered elsewhere so that they can inform applicants of this additional option when they provide outside referrals. Perhaps even more important, Self-Help should inform its very low-income borrowers of the Weatherization Assistance Program, which they can apply for separate from their home mortgage. However, the most impact that Self-Help could have on improving the energy efficiency of its borrowers is by working with them directly.

SELF-HELP RESIDENTIAL LENDING OPPORTUNITY

There are a number of possible roles for Self-Help in promoting and facilitating energy efficiency improvements among its borrowers, from cheap and simple to costly and complex. This final section presents ideas for energy efficiency initiatives and weighs the costs and benefits of each. The proposals are listed from most simple to most complex. None of them are mutually exclusive; Self-Help could incorporate none or all of these ideas. This section is intended as an initial discussion of some possibilities and relevant issues, which should serve as a launching point for a more extensive internal discussion on the merits and challenges of an energy efficiency initiative and additional research on the feasibility and potential barriers to implementation.

<u>"Best Bets" Informational Pamphlet</u>

Self-Help could cheaply and easily begin to promote energy efficiency to its home mortgage borrowers by providing a basic pamphlet on cheap and easy ways for homeowners to reduce energy consumption. Pamphlets could also include information and web addresses for some of the free online home energy audits offered by some utility companies and other energy organizations. These online audits ask homeowners to enter basic information about utility bills, energy use habits, and home characteristics and then provide general suggestions on how to improve a home's energy

efficiency.[6] The information could be included in loan closing packets, and loan officers could review the information and the importance of energy conservation with borrowers.

The benefit of this tactic is its affordability and simplicity; the only cost is printing. "Best bets" information could be provided by any one of a number of energy-oriented organizations or easily gathered internally. Loan officers already provide and review a number of resources at closing, and the borrower can hold on to the pamphlet for future reference. However, because of the quantity of information provided to borrowers during the application and closing processes, they may not retain the verbal information and quickly forget about or dispose of the physical pamphlet. In addition, although timely, this is not a unique product. Other organizations, including some utility companies, offer similar lists of easy ways to manage energy costs.

Referrals to Outside Resources

This idea is similar in delivery to the "best bets" proposal above in that it would simply be a pamphlet provided to borrowers during the closing process. However, the information would be more advanced in terms of the level of energy improvements and would refer borrowers to specific outside resources. The pamphlet could include information and contacts for professional home energy raters, who evaluate individual homes and identify key opportunities for cost-effective efficiency improvements. Self-Help could also identify several contractors of verified quality who specialize in energy upgrades. There may be existing organizations that provide reliable contractor and installer ratings or credentials for energy efficiency work, similar to the Photovoltaic Installer Certification offered by the North American Board of Certified Energy Practitioners (NABCEP No date).

This strategy would provide borrowers with reliable, tangible information on how to make more significant efficiency upgrades to their home. Like the first proposal it is very cheap, and although it would take more time to pull together the information, it is relatively easy to implement. It does however add a couple possible complications. First, if Self-Help is referring to specific contractors and related businesses rather than other nonprofit organizations or associations, there may be some liability or political concerns as far as establishing criteria for reliability, and other issues that may upset some businesses that are excluded. Secondly, the pamphlet would have to be reviewed for accuracy on a more regular basis than the simple "best bets" brochure. The energy efficiency field continues to evolve, and in order to provide meaningful information to borrowers the pamphlet must always be as accurate as possible.

Energy Efficient Mortgage

Self-Help could formally establish an Energy Efficient Mortgage (EEM) product for its typical client base, stretching income ratios and loan-to-value maximums for homes with demonstrated efficiency (through ENERGY STAR, North Carolina Healthy Built Homes, SystemVision, or an evaluation by a professional home energy rater). According to mortgage underwriter Lewis Dancy, Self-Help already occasionally provides flexibility on income ratios for energy efficient homes if advocated for by the loan officer (Dancy 2005), so it would not be too difficult to formalize.

[6] See for example the "Home Energy Saver" provided by Lawrence Berkeley National Laboratory at http://hes.lbl.gov/.

This would help make energy efficient homes more affordable and accessible to low- and moderate-income homebuyers, and in the long-run could possibly have an impact on the supply of affordable energy efficient homes. As a leader in the CDFI field, Self-Help could serve as a model for other community development lenders, with an implication for a much broader and significant impact on the availability of EEMs for unconventional borrowers. One of the benefits of this type of program is that it would be possible to implement and administer with few, if any, additional costs. The basic EEM would simply be an underwriting tool used by existing loan officers as part of current processes. Only special outreach or supporting activities such as partnerships with homebuilders or appraisers to support the construction of energy efficient homes would require additional staff time.

One challenge to offering EEMs is the possible difficulty in accurately projecting energy savings, particularly for low-income borrowers who may have previously kept their home at uncomfortable temperatures to save on energy costs. Homeowners may choose to use energy efficiency to increase their indoor comfort level, rather than maintaining a similar lifestyle and recouping the entire benefit in energy savings. This may pose a risk to using anticipated energy savings from a financed efficiency investment to boost the debt-to-income ratio of the borrower, and challenge the extent to which the loan officer can become comfortable that the borrower can afford larger monthly mortgage payments. This could also present complications for programmatic justification if altered borrower habits, which are more difficult to measure than changes in utility bills, hide a real and significant benefit of increased energy efficiency. In addition to looking at past energy usage, the loan officer may want to inquire about the average temperature of the home to determine the likelihood that the improvements will result in lower utility bills.

There are also appraisal and home value challenges to this type of program. Although research has found a significant positive relationship between energy efficiency and home value, this may not hold true across the full housing spectrum. It is possible that despite the disproportionate impact of energy costs on low-income households, less expensive homes may not see the same increase in value because of other market variables (for example, the quality of the neighborhood may not be able to support such an increase in home value). It is also possible that with the milder climate, the effect of energy efficiency on the value of homes in North Carolina may be less dramatic than national research would implicate. Another caution for both homebuyers and Self-Help is that knowledge of such issues will likely vary widely by individual appraiser (and, possibly, region). Self-Help may consider talking with local appraiser associations to determine local knowledge and application if considering any loan incentives that are tied to expectations of future appraisal.

Energy Improvement Loan

This is by far the most complex and costly possibility for helping borrowers into energy efficient homes. There are a number of ways that this could be structured, but the basic proposal is that Self-Help consider offering an energy improvement loan that would be originated with and incorporated into the mortgage. This would mean that the borrower would have only one loan payment, which would be easier both on the borrower and for Self-Help loan administration and monitoring purposes. It could be structured similar to the FHA Section 203(k) rehabilitation mortgage insurance program that incorporates home improvement costs into the mortgage, providing long-term, permanent financing with the same terms as the property acquisition loan (HUD 2005). Rehab funds are placed into an escrow account and drawn down with lender permission as costs are incurred. Self-Help is an approved Section 203(k) lender and has some past experience with this program model.

In addition to the benefit of only one loan payment and the possibly relatively attractive terms of the long-term loan, this program takes advantage of an ideal window of opportunity for undertaking energy upfits. The borrower may be able to have all work completed before moving in, which depending on the type and extent of improvements undertaken could be a major advantage. In addition, Self-Help could work carefully with borrowers to make sure they use only quality, certified contractors and other professionals and are charged reasonable prices. It also allows borrowers who can only afford a "fixer-upper" that may be very drafty and energy inefficient to access capital to improve their home. The more efficient homes will reduce energy costs and create a more comfortable and healthier environment.

There are quite a few barriers and challenges to this type of program, one of the greatest being the administrative costs. Ensuring the quality of the program and the work done would require significant staff time. Staff member Lanier Blum says that one of the major problems with the rehab lending program through FHA Section 203(k) that Self-Help actively promoted for a few years was borrowers getting overcharged by contractors (Blum 2005b). She says the program was most successful in the branches that had strong relationships with quality contractors, which all branches would have to establish in order to ensure the success of an energy rehab program. A staff member would also have to monitor the construction and approve draws from the escrow account of each loan. Finally, Self-Help would have to retain a contact person for borrowers beyond the completion of rehab in case of problems or concerns. Blum stressed that even if considering a short-term pilot of an energy improvement program, Self-Help would have to commit to maintaining a long-term relationship with these borrowers and consider the liability issues that may arise if there are any problems with the work completed.

There are also concerns about the improved home's resale value. Blum notes that in some neighborhoods where Self-Help lends, significant improvements to a home could make it the best home on the block, possibly increasing its value beyond what the market will bear (Blum 2005b). The homeowner may not be able to recoup their investment at sale even if the appraisal were to account for the value of energy improvements.

Finally, it may be difficult for homebuyers to evaluate options and proposals for how to improve the efficiency of the home before they are familiar with the house's systems. This may be particularly true for first-time homebuyers who may not have experience maintaining home systems or even paying for their own utilities.

Unlike the other suggestions, this type of program could not be implemented immediately. Considering the cost of the administrative functions, such a program would probably require a staff person dedicated to the program on at least a part-time basis. Because the improvement loans would be relatively small and require much more staff time than standard mortgages, the program costs would have to be heavily subsidized. It is highly unlikely that Self-Help would implement such a program without a grant or other outside subsidy of some kind.

Other Lending Activity

There are other ways that Self-Help could influence the energy efficiency of affordable homes outside the mortgage lending department. One of course Self-Help is already doing – incorporating efficiency into the affordable homes it builds. Self-Help could also participate via its commercial lending department – making loans to nonprofit affordable housing developers or others who incorporate energy efficiency in affordable or moderately-priced housing. In addition, the

commercial team could do targeted outreach or offer a special loan product to energy-related small businesses such as energy auditors, contractors specializing in efficiency, and solar hot water heater or other installers.

Recommendations

Because of the numerous benefits of energy efficiency and its fit with Self-Help's mission, I believe it is in the best interest of the organization to help borrowers understand and implement energy efficiency improvements. The mortgage lending team should prepare two informational pamphlets – one list of "best bets" for keeping down household energy costs to provide to all borrowers at closing, and a more in-depth explanation of existing outside resources that loan officers can offer at their discretion to borrowers whose homes are inefficient and who may have the motivation and financial means to make energy improvements. The second resource should be reviewed once a year to make sure the information is accurate and to add any new resources that have emerged in the field. The first resource should be reviewed once every several years to make sure the suggestions are still appropriate and any technology or products listed are still available and cost-effective.

Self-Help should also formalize an energy efficient mortgage program, communicating to all loan officers the financial benefits of an energy efficient home and clearly delineating underwriting flexibility for homes certified as energy efficient. Self-Help should establish partnerships with ENERGY STAR, North Carolina Healthy Built Homes and other SystemVision homebuilders and position itself as the state's EEM lender for low- and moderate-income borrowers who cannot qualify for a conventional mortgage.

While all loan officers should be aware of and able to provide these resources and products, the mortgage lending team should designate one staff person to become an energy expert and point person. This staff member can maintain the informational pamphlets, serve as the organization's contact for outside organizations, and be a clearinghouse for staff questions about the EEM. The role should be transferred to someone else if the staff "energy expert" leaves Self-Help, to maintain continuity and retain institutional memory.

Given the complexity of the loan improvement program and the fact that the mortgage lending team is already frequently stretched thin, I recommend that Self-Help not pursue the energy improvement loan option at this time. This may be a good long-term strategy, and the other strategies can warm up the lending staff to the benefits of energy efficiency and possibly create a stronger base of support for a more complex program. In the meantime, the organization can begin to test the waters in finding a program subsidy, exploring partnerships with organizations such as the North Carolina Housing Finance Agency and the N.C. State Energy Office who have both demonstrated an interest in energy efficiency for low-income households.

CHAPTER 3

ENERGY EFFICIENCY & COMMERCIAL BORROWERS

The primary challenge of a commercial energy efficiency initiative from a Self-Help perspective is that because the array of issues is so broad, it is hard to generalize about commercial energy issues and design one program that would meet the needs of all borrowers. This chapter includes a brief overview of commercial energy consumption and building issues, existing financing options that are available to businesses, and preliminary examination of the role that Self-Help could play in promoting commercial energy efficiency. One of the main recommendations of this chapter is that Self-Help focus on one sector initially, and expand energy efficiency programs once staff have gain some experience in the area. **Chapter 4** provides a specific plan for implementing an energy efficiency initiative for charter school borrowers.

OVERVIEW

This section provides some insight into general energy consumption by the commercial sector, and also discusses issues related to building ownership and how tenancy may impact the type and extent of energy improvements considered by a business.

Energy Consumption

A basic understanding of how energy costs are distributed is important for identifying opportunities for savings. Commercial energy facts:

- Heating, cooling, and lighting are the major energy users targeted for energy conservation across the commercial sector generally.
- Major energy expenditures (percent of total energy expenditures, from the 2005 Buildings Energy Data Book (D&I International 2005)):
    - 14% space heating;
    - 24 % lighting (lighting consumes 40% of electricity in commercial buildings, and requires an additional 10% of electricity to cool excess heat generated by the lighting (Pimentel et. al. 2004, p. 288).
    - 11% space cooling;
    - 6% water heating
    - 6% ventilation;
    - 6% refrigeration.
- Ninety-four percent of buildings rely on electricity for at least a portion of their energy, and 57% use natural gas.
- Just over 50% of buildings used natural gas for heating and 40% used electricity.
- Electricity was used as the energy source for cooling in 94% of cooled floorspace.
- Natural gas and electricity were each used by one-third of buildings for water heating (data on solar hot water heating was apparently not collected by the 1999 CBECS).

Of course, actual energy use will vary business to business based on industry sector, region of the country, and building size.

Table 3.1 provides estimated energy costs per square foot by primary building activity for buildings surveyed by the EIA as part of the 1999 CBECS. This is an incomplete and complicated picture, as business and building sizes vary and the data does not consider costs as a percentage of total revenue. Also, the CBECS is limited to collecting information by primary building activity, so the numbers are not pure representations of costs by business type. However, this is the most comprehensive data that could be found on the subject. This information provides a quick snapshot of potential industries that could be targeted for further research. A few building activities that register high energy intensity include dry cleaners and laundromats, grocery stores, laboratories, and food services.

Table 3.1: Energy Costs Per Square Foot by Primary Building Activity, 1999 (in US dollars)

admin/professional office	1.51
auto dealership/showroom	1.22
auto service/auto repair	1.07
bank/financial	1.87
clinic/outpatient health	2.06
college/university	1.68
courthouse/probation office	1.40
doctor/dentist office	1.25
dormitory/frat/sorority	1.15
dry cleaner/laundromat	3.85
elem/middle/high school	0.87
enclosed mall	0.95
entertainment - theater/sports arena/nightclub	1.23
fire/police station	1.13
govt office	1.59
grocery store/food market	3.68
hospital/inpatient health	2.30
hotel	1.70
jail/reformatory/penitentiary	1.71
laboratory	2.99
library/museum	1.29
motel/inn/resort	1.42
non-refrigerated warehouse	0.53
nursing home/assisted living	1.68
other	1.14
other education	0.95
other food sales or service	5.87
other health care	1.61
other lodging	1.36
other office	1.72
other public assembly	1.35
other public order and safety	0.98
other retail	2.26
other service	1.28
post office/postal center	1.26
preschool/daycare	1.00
recreation - gym/bowling alley/health club	1.49
refrigerated warehouse	1.50
religious worship	0.62
repair shop	1.04
restaurant/bar/fast food/cafeteria	3.63
social meeting center/convention center	1.01
store	1.30
strip shopping center	1.44
vacant	0.33
Average Total	**1.37**

Source: Energy Information Administration, 1999 Commercial Buildings Energy Consumption Survey, Public Use Microdata.

Building Ownership
The 1999 CBECS survey found that approximately 68% of U.S. commercial buildings are owner-occupied. While a number of people in the field have indicated that owners are more likely to invest in energy efficient improvements than those that are leasing their space, building tenants should consider energy efficiency as well if they are paying part or all of their utility costs. There are a number of non-structural options for tenant businesses that want to reduce energy costs, such as installing efficient lighting fixtures, motion sensors to control lighting, programmable thermostats, and investing in energy efficient equipment.

For more extensive improvements, there may be opportunities for a creative agreement between the tenant and landlord. Tenants could negotiate a financial incentive from landlords for making upgrades that would increase the value of the building, or could make it more attractive for future tenants. For example, an antique center in New York was located in a very drafty building. The business owners made a mutually beneficial arrangement with the landlord – they spent $1,100 on insulation and the landlord installed a new roof. The tenants benefited from a $400 annual decrease in energy costs, and the landlord's building became more valuable and attractive to tenants (EPA No date(b)). Another strategy for increasing the efficiency of commercial buildings is to target developers, encouraging them to construct buildings that will save future owners and tenants money on their utilities.

SELF-HELP BORROWERS

To see how Self-Help borrowers are affected by energy costs, I took a random sample of existing small business borrowers to see what portion of actual or projected expenses were represented by utility costs. The sample was small, and results suffer from a number of limitations. Only about half of the loan files include detail on utility cost, and for the vast majority that did include information, it is unclear what is included under the "utility" category.[7] Also, many of the numbers available are financial projections for start-up businesses, prepared by borrowers who may have had little past experience on which to base their numbers. It is also possible that for projections provided as part of the loan application process, borrowers downplayed expected expenses in order to meet required underwriting requirements. However, it provides an anecdotal look at energy impacts on Self-Help borrowers.

Of a random sample of 32 borrowers, utility information was available for 18. For two businesses, data was available for two separate years, for a total of 20 observations. Of these 20 observations, utility costs represented an average of 5% of total expenses, with ranges from 0.07% (janitorial service) to 17% (beauty salon). **Appendix D** includes the full results, including business type and whether or not the listed numbers represent actual or estimated utility costs. Five percent is not an insignificant portion of expenses. For businesses with narrow profit margins, a decrease in expenses of even one or two percent could have a real impact on cash flow. Lower utility costs proportions would also help limit the impact of price increases and variable monthly utility costs for business that are not on an equal payment plan (in which annual utility costs are averaged out over the year).

[7] Unless included as a separate line item, presumably it includes telephone costs (many of the utility cost numbers came from IRS 1040 Schedule C for sole proprietorships, which can include some telephone expenses).

FINANCING: EXISTING OPTIONS

This overview of commercial energy efficiency financing includes an analysis of existing options for average Self-Help commercial borrowers, as well as financial incentives of which Self-Help could encourage borrowers to take advantage (such as tax credits).

Internal Financing

Particularly for lower-cost improvements, internal financing will be one of the easiest options for some businesses. This requires that the business have available cash, either from the operating budget or capital funds. The benefits of internal financing include its low cost, quick and simple implementation, and the retention of all energy savings. If a business prefers to finance energy efficiency internally, it can use cash from its operating budget to create a revolving investment fund for improvements (DOE No date). The fund could be replenished and increased with additional cash from energy savings. However, internal financing limits cash available for other purposes. Also, many small businesses do not have significant cash reserves or enough room in their operating budget to allow for additional expenditures.

Conventional Debt Financing

If businesses cannot internally finance desired efficiency improvements, they can go to a conventional lender for a loan. I did not come across any lenders in North Carolina that offer lower interest rates or other special packages for business that want to invest in energy efficiency, so organizations desiring a conventional loan in North Carolina would likely approach a lender with which they have an established relationship, or shop around for the lowest interest rates and fees. Businesses with little extra room in their operating budget to pay off additional debt could look for a lender willing to structure the loan so that it can be paid off with energy savings, but this requires a lender to have some knowledge and confidence in energy cost savings potential or a professional who can verify expected returns. Whether conventional financing will make sense for a business will depend on whether it will still receive its desired rate of return on the investment after accounting for the loan's interest rate, fees, and the time and hassle of applying for the loan. Debt financing may not be the best route for small investments, due to time and transaction costs.

Leasing

While not an option for structural improvements, businesses looking to invest in energy efficient equipment could consider lease or lease-purchase opportunities. There are two different lease types: operating and capital (or financing) leases. Operating leases are essentially equipment rentals, usually with leases of less than a year (DOE 2004). Capital leases allow the lessee to pay for the equipment in monthly installments, which are usually higher than the fees charged for operating leases but provide the lessee with the opportunity at the end of the lease to purchase the equipment for a nominal fee. In addition, equipment under a capital lease is considered to be the property of the lessee, allowing the lessee to claim depreciation and other tax benefits (DOE 2004).

Depending on the lease terms, capital leases may be a good choice for equipment with a relatively long payback period, but whose energy savings would be greater than monthly installment payments. The lease would preclude the time and hassle of applying for debt financing and may be less risky than internal or debt financing if the business were to close before the investment paid for itself in

energy savings. However, the financing cost would probably be greater than most debt financing, and there may be significant fees for lease termination.

Performance Contracting

Energy performance contracts are usually special operating or financing leases in which an Energy Service Company (ESCO) or equipment manufacturer guarantees that efficiency equipment or improvements will pay for themselves in energy savings. Many of the contracts also provide for additional services, such as design, installation, or maintenance (DOE 2004). These contracts typically have investment requirements greater than $200,000 and relatively long payback periods (DOE 2004 & NAESCO No date), are beyond the scope of energy improvements that most Self-Help borrowers would consider. However, some community facilities or commercial real estate borrowers may want to consider this option if the scope of necessary energy improvements is large enough.

Government Lending Programs

There are a handful of government energy efficiency lending programs that could serve Self-Help customers.

Energy Improvement Loan Program

The Energy Improvement Loan Program (EILP) is a low-interest rate loan program (3% interest rate, with special 1% rate available for certain technologies) available through the North Carolina State Energy Office (SEO) for renewable energy and energy efficiency improvements (SEO 2005). Commercial businesses, nonprofits, and public entities can borrow up to $500,000 for energy improvements, to be paid off with energy savings. Unfortunately, any portion of energy improvements covered by the loan program is ineligible for the new federal tax credits for solar and geothermal energy (DSIRE No date).

Despite the attractive interest rate, the program has seen relatively little activity. This is likely due in part to the requirement that applicants obtain a letter of credit, an expensive and cumbersome process that is unfeasible for most small businesses. SEO is offering a special incentive to cover the cost of the letter of credit (maximum 1% of loan value) for borrowers who apply through June 2006, but it is unclear whether that has increased loan applications – there may be additional barriers to program access. It would be ideal for Self-Help to be able to refer borrowers to this program as a supplement to Self-Help loans, so that borrowers could take advantage of low interest rates on energy improvements. Self-Help should further explore program activity to date and reasons for underutilization, to see whether it is a good referral source for any borrowers. Schools are exempt from the letter of credit requirement, so that potential barrier is not applicable to charter school borrowers.

USDA Renewable Energy & Energy Efficiency Grant and Loan Program

The 2002 Farm Bill included a component that requires the U.S. Department of Agriculture (USDA) to provide direct loans, loan guarantees, and grants for the purchase of renewable energy systems and energy efficiency improvements to agricultural producers and small businesses in rural areas. For fiscal year 2006 (which started October 1), the guaranteed funds available are around $220 million. This is the second year of the guarantee program that will expire at the end of next fiscal

year unless it is re-funded. Rossie Bullock, program administrator for North Carolina, feels that there is a good possibility it will be continued (Bullock 2005).

Notices of grant funding availability are released periodically, and Self-Help should stay abreast of grant funding that may be a fit and an important outside resource for some rural borrowers. More directly, Self-Help could utilize the guarantee program for eligible loans, helping the organization get more comfortable with weak borrowers. Self-Help has experience with other USDA guarantee programs, and Bullock is very eager to see the program utilized by North Carolina businesses. The maximum loan amount for the program is $10 million, and the maximum USDA guarantee ranges from 70% to 85% depending on loan size.

The guarantee program was only established a couple months before the end of last fiscal year, so it is difficult to gauge the demand thus far. There were no North Carolina applicants for the guarantee last year. There has also been little action within the state on the grant side – there were just five North Carolina applicants in 2005, and only three were funded for very small amounts (less than $5,000).

Tax Incentives

North Carolina Renewable Energy Tax Credit

North Carolina offers a generous tax credit to corporate entities and individuals who invest in renewable energy, including technologies such as solar hot water systems, photovoltaics, solar thermal electric, wind, and biomass. Daylighting and passive solar space heating are also eligible. The installation of one of these systems qualifies the buyer for a tax credit equal to 35% of purchase, installation, and related costs. For the commercial and industrial sectors, the tax credit is limited to $2.5 million (this was increased in 2005 from $250,000). The tax credit is taken in equal installments over five years and cannot exceed 50% of the total tax liability for the year. The credit is set to expire at the end of 2010.

Although it appears to be a great financial incentive for corporations, only 16 of the 312 state tax credit claims (just over 5%) filed in 2003 were by corporations (Murawski 2005).[8] Bob McGuffey of the North Carolina Solar Center confirmed that the majority of tax credit questions that he receives come from homeowners, and while he does not see a barrier to commercial use he has talked to few businesses interested in the tax credit (McGuffey 2006). Self-Help may be a good vehicle to get out the word about the credits to smaller businesses, as part of existing or new resource materials for all loan applicants and as part of any outreach effort to targeted industries.

Federal Solar & Geothermal Business Energy Tax Credit

The federal government offers a similar income tax credit for commercial and industrial operations. Businesses can claim 30% of costs for solar, fuel cell and solar hybrid lighting, and microturbine systems placed in service from 2006 and 2007 (DSIRE No date). In 2008, tax credits will be reduced to 10% of costs. Geothermal technologies are currently eligible for credits up to 10% of costs. Eligible solar technology includes water heating, space heating, thermal electric, thermal process heat, and photovoltaic. Unfortunately, the new rules stipulate that the credits cannot be combined with "financing provided under a federal, state, or local program the primary purpose of which is to provide subsidized financing for projects designed to conserve or produce energy" (DSIRE No

[8] However, most of the nearly $900,000 in credits in 2003 went to the corporations (Murawski 2005).

date) – any portion of technology cost covered by a program such as N.C.'s Energy Improvement Loan Program could not be factored into tax credit calculations.

Tax Deduction

The Energy Policy Act of 2005 established a tax deduction of up to $1.80 per square foot for energy efficiency improvements to commercial buildings, taken the year the building is placed in service. For public buildings, there is a special provision that allows for the deduction to be passed through to the "person primarily responsible for designing the property" (CBTDC No date). Nonprofits are not eligible for the pass-through. The deduction is good for buildings placed in service between January 1, 2006 and December 31, 2008.

Eligible buildings are those that meet the following requirements:

> "1. Installed on or in any building located in the United States that is within the scope of Standard 90.1-2001, Energy Standard for Buildings Except Low-Rise Residential Buildings, of the American Society of Heating, Refrigerating, and Air Conditioning Engineers and the Illuminating Engineering Society of North America;
>
> 2. Installed as part of (i) the interior lighting systems, (ii) the heating, cooling, ventilation, and hot water systems, or (iii) the building envelope; and
>
> 3. Certified as being installed as part of a plan designed to reduce the total annual energy and power costs of interior lighting systems, heating, cooling, ventilation, and hot water systems of the building by 50 percent or more when compared to a reference building, which meets the minimum requirements of Standard 90.1-2001 (as in effect on April 2, 2003)" (CBTDC No date).

Certification must be met, and building inspections completed, to verify eligibility for the deduction. Partial deductions are allowed within certain systems savings targets, with a maximum allowable deduction of $0.60.

Other State Incentives

The North Carolina Solar Center recently expanded the Database of State Incentives for Renewable Energy (DSIRE) to include energy efficiency incentives. This database can serve as a clearinghouse for additional incentives, or changes to existing program and policies, offered by the federal government and North Carolina. In addition, for Self-Help lending outside North Carolina (such as charter school lending), this database can be a source of information on financial incentives for energy efficiency investments in the home states of non-North Carolina borrowers.

SELF-HELP COMMERCIAL LENDING OPPORTUNITY

Many of Self-Help's commercial borrowers do not meet the underwriting guidelines of conventional lenders. Thus, Self-Help could play a key role in energy efficiency lending to marginal businesses, which may see the greatest relative benefit from an energy cost reduction. The numerous benefits of energy efficiency are outlined in **Chapter 1**, and the direct and indirect benefits to Self-Help and borrowers justify strong consideration of an energy efficiency initiative for the commercial lending division. However, such an initiative would not be without challenges. The charter school case study in **Chapter 4** will explore in greater depth the challenges that may be faced by an initiative directed at schools. Briefly, the issues that may face a more general commercial initiative include:

- *Delays*. Energy efficiency considerations could delay the loan approval process, resulting from commissioning energy audits, or modifying construction budgets and plans in the case of facilities loans.
- *Overwhelmed Borrowers*. The existing lending process is already overwhelming for some borrowers, and this could be exacerbated by new energy considerations.
- *Access to Qualified Contractors*. Energy savings will depend on the quality of work performed; Self-Help may need to help borrowers identify experienced professionals.
- *Appraisal Issues*. Building owners may rightly be concerned about investing money into property that may not be recouped upon resale.
- *Administrative Costs*. An energy efficiency initiative could add significant administrative costs, as a result of staff training on energy issues and increased borrower technical assistance.

Recommendations for Self-Help Commercial Energy Efficiency Lending

Given the breadth of the commercial sector and the resulting challenges of gaining an in-depth understanding of energy issues as they relate to different types of businesses, I recommend that any substantial Self-Help energy efficiency initiative begin by focusing on one sector. This will allow staff to become more familiar with energy efficiency issues, and will provide an opportunity to evaluate the benefit to borrowers of Self-Help assistance. If the implementation burden is not too great and benefits are apparent, the initiative could be expanded to additional business types or to a broad energy efficiency program. Given preliminary research and staff interest, a focus on charter schools has already been chosen and initial efforts to establish an energy component to charter school lending have already begun. Charter school lending opportunities are discussed in **Chapter 4**. However, there remain some opportunities to begin to lay the groundwork for a broader initiative, and recommendations are outlined below.

- Self-Help already provides a brochure with energy conservation information as part of the commercial loan application package. This provides simple suggestions on ways to conserve energy, such as switching to more efficient light bulbs. The brochure also lists some resources that are available outside Self-Help. This is a great resource, but could be improved upon in the following ways:
    - Currently, no one is responsible for maintaining the brochure. This responsibility should be assigned to an interested staff member, to ensure that recommendations and referrals provided are always up-to-date.
    - This basic brochure could be expanded to provide more in-depth information on the recommendations, such as average cost, energy savings, and payback period, to help borrowers better evaluate the financial returns.
    - Rather than simply providing the brochure as part of the loan application, loan officers could be encouraged to discuss the information in the brochure with borrowers.
    - A second brochure could be created to move beyond more of the operations and maintenance ideas to building improvement opportunities, to be offered to borrowers who have a construction or renovation component to their loan.

- Self-Help could consider encouraging borrowers to obtain energy audits. The organization could explore opportunities for grants or partnerships that would allow for low-cost or free energy audits, or could offer more attractive loan terms or other incentives to borrowers

who commissioned an audit. This could be available for all commercial borrowers, or targeted to borrowers in specific high-energy-intensity businesses.

- A successful program would require that loan officers have a basic knowledge of energy efficiency and Self-Help's motivation for its promotion. Staff education might include: the basics of energy efficiency (benefits, technologies, etc.); a general understanding of how energy efficiency improvements offer different benefits to different businesses; how to interpret estimates of costs savings; and an understanding of payback period analysis. Self-Help could proactively begin considering ways to introduce these concepts to loan officers in advance of any major energy initiative.

- ENERGY STAR's Eric Coffman (2005) believes that more attractive financing or incentives are necessary to encourage businesses to take the time to look into energy efficiency options. Subsidized loans are not standard practice at Self-Help, as the organization believes in self-sufficiency and adequate risk compensation. However, with a source of funding to cover costs and a solid demonstration of mission fit and the need for a low-interest rate program, this could be a potential long-term possibility. Self-Help should conduct more research, such as a survey of existing borrowers or other target audiences, to determine whether the cost of capital is preventing them from considering energy efficiency options.

CHAPTER 4

CASE STUDY: CHARTER SCHOOLS

OVERVIEW

Self-Help's commercial lending team has a special Community Facilities Fund that provides financing to nonprofit and human services organizations, including charter schools, child care businesses, and health care facilities. Self-Help has a particular niche in charter school lending. To date, the organization has made 44 loans to 22 charter schools totaling over $50 million, primarily for school facility acquisition, construction, and renovation. Currently, Self-Help has one full-time charter school loan officer and several other loan officers and staff members who dedicate part of their time specifically to charter school lending, technical assistance, and support. Because charter school administrators typically have little experience in construction, Self-Help frequently provides extensive assistance in the construction process.

Because of staff familiarity with the details of charter school issues and the level of technical assistance already provided, charter schools present a unique opportunity for Self-Help to begin introducing energy efficiency considerations to commercial and community facilities borrowers. In addition, a large percentage of the charter school loans have a construction component, making energy efficiency especially applicable. As a further motivation, studies show that schools reap substantial non-financial benefits from energy efficiency, such as improved student health, academic performance, and curriculum enhancement opportunities.

This case study explores some of the key energy efficiency options available to schools, the benefits and challenges to implementing an energy efficiency component to Self-Help's charter school lending program, and possibilities for implementation. Because energy issues are often part of broader green building objectives in the school building field (particularly around indoor air quality considerations), some green building features that are not purely energy related will be included in this section. "High performance" and "green" will sometimes be used interchangeably with "energy efficient" when discussing comprehensive school building design and objectives.

Charter Schools Facilities Lending

Unlike traditional public schools, in most states charter schools do not receive funding for facilities from their local school district. Facilities must typically be paid for out of slim per-pupil operating funds provided by the district, essentially meaning that charter schools have to do more with less money than standard public schools. According to the Local Initiatives Support Corporation (LISC), "The lack of access to appropriate facilities and sufficient financing has been widely documented as the largest hurdle facing charter school operators and has resulting in facilities that are in no way comparable to those of traditional public schools" (LISC 2005, p. 2). The Kauffman Foundation found that charter schools that have adequate facilities are less likely to fail, and that 10% of failed schools listed "lack of a suitable property" as the reason for closure (Kauffman Foundation 2005, p. 5).

Community development financial institutions (CDFIs) and other private nonprofit organizations have responded to the need for charter school facility financing. Self-Help is one of eight CDFIs and 19 total nonprofit organizations around the country providing lending for charter school facilities, and is one of the largest in total loan amount (LISC 2005). Self-Help has received New Markets Tax Credit allocations and a federal Charter School Credit Enhancement Grants that allow the organization to offer lower interest rates for some eligible schools, making debt more accessible and affordable to marginal charter school borrowers. Self-Help's primary target area includes the Southeastern states of North Carolina, South Carolina, Florida, Tennessee, Georgia, and Texas, although the organization also responds to loan requests from schools in other states who cannot access financing from lenders in their region.

According to a study by the Kauffman Foundation, about 29% of charter schools lease their facility, and an additional 14% are in leases of 10 years or more (Kauffman Foundation 2005). As schools mature, this percentage is likely to increase. In combination with the growth of the charter school movement, Self-Help's growing national reputation as a charter school lender, and more mature lending programs and marketing efforts, charter school lending is likely to remain a strong Self-Help opportunity for some time.

Despite a perception of high charter school failure rates, which would translate into significant lending risk for Self-Help, the Kauffman Foundation has found that most of the school failure concerns are unfounded. Not only is the cumulative failure rate much lower than past reports have indicated but, says the Kauffman report, "of all charter schools that have ever opened in this country, 5.95 percent have closed in a way that impacted their landlords or real estate financiers" (Kauffman Foundation 2005, p. 5).[9] In addition, despite concerns over limited resale or release value of school facilities, of the facilities vacated by closed schools, nearly 96% were in use by new tenants when Kauffman conducted its study.

Self-Help is currently surveying charter school lenders and inquiring, among other things, whether they have an energy or green building component to their lending or technical assistance programs. The results of the survey are not in, but other research has identified only one CDFI that is encouraging charter school energy efficiency—The Reinvestment Fund (TRF), which encourages charter school loan applicants to also consider utilizing its Nonprofit Energy Savings Investment Program (NESIP). The Reinvestment Fund service area (mid-Atlantic states) does not overlap with Self-Help's primary target regions, resulting in little competition and a great opportunity for impact if Self-Help were to implement a charter school energy efficiency initiative.

ENERGY EFFICIENCY & GREEN BUILDING OPPORTUNITIES

To-date, Self-Help has made loans to 22 different charter schools, several of which have taken out more than one Self-Help loan. Two of the schools have received working capital loans and three have used loan proceeds for property acquisition only. However, the remaining 17 schools have used a Self-Help loan for new construction, modular and portable buildings, or renovation of an existing building (some schools have used proceeds for a combination).

[9] The Kauffman Foundation did find that older schools are more likely to close, with schools five years and older having a cumulative real estate risk rate of 8.6%. The study was not able to identify the reasons for later-life closures, but this potential longer-term risk is something to keep in mind.

Table 4.1: School Facility Types Funded by Self-Help

Type of Construction	Number of Schools	Percentage of All School Borrowers
New Construction	6	27%
Renovation	9[10]	41%
Modular & Portable	5	23%

Of 10 charter schools loans currently in the pipeline, two are requesting funding for new construction, two for renovation of facilities, and one for portable classrooms.

Not all energy efficiency opportunities are feasible for all types of construction, and it is important to recognize that some renovation projects may not have the same comprehensive high performance potential as new construction. This section introduces a number of possible improvements, listed in construction category that would be the minimum level of construction extent under which it would be applicable (i.e. recommendations listed under "Minor Renovation" would, for the most part, also be applicable to new construction or major renovation). These items are just a sampling of the types of improvements that are possible; they were identified by the author as having a potential benefit for borrowers, financial or otherwise.

One recommendation discussed later is that this research be used as a launching point for a professional resource on "best bets" for high performance charter schools, to be created by a development professional with experience in the area. In the meantime, the best resource that I have found for evaluation of the relative costs and benefits of design options is the Department of Energy's "National Best Practices Manual for Building High Performance Schools" (DOE 2002c). This nearly 450 page manual has detailed information numerous technologies, including: the climate and rooms of the school in which they are applicable; integrated design considerations, such as suggestions for how other systems can be downsized based on the benefits of a given technology; benefits; cost-effectiveness; design details; operations and maintenance considerations; and whether it should be included in a commissioning process. The manual provides a wealth of information that can be used to build upon the summary information in this report. One gap in the manual is a focus on indoor air quality considerations; the recommendations primarily focus on energy efficiency and resource conservation.

New Construction & Major Renovation

The most effective energy efficiency improvements are part of a comprehensive high performance building design (Davis 2005). It is important to have a project design team that can look at the interaction of all of the building's systems, and how each will affect the energy use and performance of the others. For example, the standalone process of adding daylighting features to a building increases costs. However, because of the reduced demands on other systems such as HVAC, other items can be downsized to make up for some or all of the daylighting cost (Davis 2005). Because of the complexity and interrelatedness of all systems, it is important to incorporate high performance design standards from the beginning of the planning process. Therefore, the most effective high

[10] One of the loans here was actually made to the landlord of a charter school, not to the school directly.

performance school buildings will be new construction or major renovation projects that have considered the role of energy every step of the way.

Building Orientation

Depending on site constraints, building orientation to maximize sun light and energy may be one of the simplest and cheapest options if considered from the beginning of the design process. By orienting buildings on an east-west axis, schools can maximize south-facing windows to provide winter daylight and minimize exposure to hot summer sun to the east and west (DOE 2002a). The south-facing roofs provide the option of installing solar hot water heating systems. Buildings can also be situated on the site in a way that allows them to take advantage of local prevailing wind patterns to provide natural ventilation (DOE 2002a). Schools in cooler climates may want to consider a two story structure, which cuts heat losses from the foundation and roof areas (DOE 2002a).

Daylighting

Daylighting is discussed frequently in the literature because of the numerous non-energy benefits it provides. One of the main benefits is reduced need for artificial lighting – Peet et. al. found that skylights and other daylighting technologies increase lighting energy savings by 20-30% (2004, p. 7-284). Further, daylighting can reduce the heating and cooling needs of a building. After children, the second largest generator of heat in school buildings are lights (Davis 2005). Daylighting has a very high lighting efficacy rate (the ratio of generated light to heat) (DOE 2002a), and reduces the cooling load of the building compared to traditional artificial lighting. Daylighting can also maximize the use of light as a heat source in colder months, lowering heating energy requirements. The Peet et. al. study noted a total energy savings (from lighting and HVAC) between 15-20% for buildings studied, which the researchers believe could be more than doubled with an "optimum" daylighting system.

Daylighting can take several forms:

- *Roof monitors* are "popped up" and angled roof sections with south- or north-facing vertical glass. The result is diffused sunlight, reducing glare, lighting variation and shadows, and overheating that can be caused by direct sunlight.
- *Tubular skylights* consist of a metal tube with a highly reflective interior that connects a roof-mounted lens with a light diffuser at the ceiling of the building interior (PATH No date). While still not cheap, this option is much more affordable and presents less design issues than roof monitors.
- *Standard skylights* are not always the best option, its direct sunlight often causes significant heat gain, glare, and can result in UV damage to building interiors such as carpets (PATH No date).
- Horizontal *light shelves* in windows "bounce the sunlight that strikes the top of the surface deep into the building" (DOE 2002a, p. 15). Light shelves are good options for lower-floors of multi-story buildings that cannot be as easily served by roof monitors or skylights.
- "[South-facing] *roof overhangs* can be designed to effectively admit low-angle winter radiation for daylighting and exclude excessive higher-angle sunlight in the warmer months" (DOE 2002a p. 13).

Daylighting improvements often add little or no net cost to construction, due to the fact that schools can install smaller HVAC systems (Plympton et. al. 2000 and Davis 2005). Even when the addition of daylighting adds upfront costs, the payback period is usually very short as a result of

these significant energy savings. Innovative Design completed 11 North Carolina schools that utilized daylighting and other high performance features between 1991 and 2004, with final construction costs averaging 10% below the school districts' budgets (Innovative Design No date(a)). Durant Road Middle School in Raleigh is one of a number of schools that have benefited from daylighting and other energy improvements. While the addition of daylighting to Durant Road (a non-charter public school) was estimated to add $230,000 to construction, the daylight improvements allowed the school to save $115,000 in mechanical equipment and electrical systems. The remaining $115,000 represented less than 1% of the total construction budget and was returned in energy savings in under two years (Nicklas & Bailey 2002 and Innovative Design No date(a)). The school's annual operating costs are $0.50 per square foot below the average for comparable schools in the area, saving the school $77,000 the first year (Innovative Design No date(a))

Daylighting must be carefully designed. Buildings with too much window surface can lose conditioned indoor air, and direct sunlight can overheat rooms and cause glare. Daylighting should be promoted with caution; borrowers and Self-Help staff should consider an architect's experience with daylighting before proceeding. In the case that the borrower already has an architect with little or no daylighting experience, it may be best to consider other energy improvement options instead.

Building Shell

High-mass exterior walls, such as brick, can prevent indoor heat transference during the day due to the time lag between heat gain and loss; in warmer months, high mass walls will absorb heat during the day and release it several hours later, often after the building is empty. Another source of heat gain comes from the roof. According to the DOE, "In the warmer months, up to 90% of the cooling load coming from the roof area can be attributed to radiant heat gain" (DOE 2002a, p. 23). However, radiant barriers in the roof, such as aluminum, can reduce heat gain through the top of the building by up to 95% (DOE 2002a, p. 23).

Windows

Carefully-chosen high performance windows can reduce the heating and cooling load of a building, even allowing for downsizing of HVAC systems if properly designed and integrated (DOE 2002c). Operable windows can provide natural ventilation, also reducing demand on building systems (DOE 2002c). Properly designed window treatments, both indoor and outdoor, can also increase building performance and comfort.

Heating, Ventilation, and Air Conditioning (HVAC)

The DOE (2002) recommends that when choosing HVAC equipment, schools consider projected initial cost, maintenance expense, annual energy cost, energy and labor cost escalation rate, and replacement cost. While charter schools may be or feel limited by the upfront cost and cannot base a decision wholly on life-cycle costs, administrators and their building team should consider the life-cycle costs of systems within a feasible range of upfront costs. Dehumidification systems that condition the air before it reaches the HVAC can reduce the cooling load in warm and humid months (DOE 2002a). Use of natural ventilation when appropriate can also reduce the use of mechanical ventilation systems. Schools should carefully consider the specific heating, cooling, and ventilation needs of the building given local climate, times of building use, and other building factors that may affect heating and cooling load including any relevant energy efficient improvements.

Commissioning

While building commissioning may only be a feasible option for larger charter schools given upfront costs, the long-term benefits could be substantial. Essentially, building commissioners are professionals that determine whether a building's systems are working properly and efficiently. The Collaborative for High Performance Schools (CHPS) explains that building systems used to be fairly straightforward, but today "complex building technologies rely on the inter-relationships of all the systems, controlling lighting, heating and cooling, and windows. It isn't enough to simply assume that each individual contractor is doing their job" (CHPS No date). Among other things, building commissioning helps to ensure that all systems are properly coordinated with each other to achieve maximum efficiency. It also lowers operations and maintenance costs, such as by increasing equipment life (Kats 2003, p. 73). While this is typically done at the end of a new construction project, "retro-commissioning" is an option for existing buildings. A study of a limited number of LEED office buildings and schools found that basic building commissioning (as required by LEED) was equivalent to 0.3 to 0.6% of construction costs (Kats 2003, p. 72).

Late Incorporation & Minor Renovation

One key challenge to a Self-Help charter school energy efficiency initiative is that many charter school borrowers approach Self-Help relatively late in the construction planning process, and incorporating whole building design issues would not be time effective or even feasible. This section suggests items that could be incorporated later in the design process, and could also be relevant to some minor renovation projects.

Lighting & Controls

Efficient lighting can reduce lighting costs and increase lighting quality, often very significantly. For some spaces, low-level ambient lighting can be combined with task lighting that is only used as necessary (DOE 2002a). Lighting controls, such as occupancy and photosensors, can limit lighting when there is sufficient daylight or the room is not in use. While a relatively minor use of energy, exit signs are on 24 hours per day every day. Light-emitting diode (LED) exit signs can last up to ten times as long as standard signs and use eight times less energy, saving around $10 annually on each sign (EPA No date(a)). It does not appear that LED signs are necessarily more expensive than standard signs.

Color Choice

Choice of building colors can play a role in reducing energy costs and may not add any cost to construction. Light-colored exterior walls and roof materials reflect heat away from the building during warm months, reducing the cooling load (DOE 2002a). By reducing cooling requirements and extending roof life, "cool roofs"[11] on school buildings see a 20-year net present value benefit of $0.72/sf ($0.75/sf for other buildings) (Kats 2003, p. 79). Light colors in the interior decrease lighting requirements (artificial and daylighting), and carefully chosen paints can also reduce glare (DOE 2002a).

Equipment & Appliances

As old equipment wears out and must be replaced, schools should consider energy efficient replacements. The U.S. Environmental Protection Agency has established ENERGY STAR product

[11] "Cool roofs" as used here includes light-colored and reflective roofs, shaded roofs, and "green" roofs that are densely planted.

labeling to distinguish the most energy efficient appliances on the market in numerous product categories. Kitchen equipment, computers, lighting, HVAC systems, and other products are all available in efficient models (EPA No date). Many are cost-efficient in the long run, and some may cost little or no more than the average model on the market.

SELF-HELP HIGH PERFORMANCE CHARTER SCHOOLS INITIATIVE

Benefits of High Performance Charter Schools

The most important benefit from a lending perspective and a key motivator for schools is the annual savings that result from an energy efficient or "high performance" school. School buildings consume significant amounts of energy, primarily in heating, cooling, and lighting the large structures. In typical schools, 41% of energy use is for cooling, 30% for lighting, 14% for heating, and 8% for hot water (DOE 2002a, p. 31). DOE reported typical school energy costs of $0.90 per square foot in 2002, and claimed that new schools could lower energy costs to $0.45 - $0.68 per square foot (up to 50% savings) for little or no extra cost (DOE 2002b). There are other significant non-financial benefits of energy efficiency, many of which are explored in depth in **Chapter 1**. Below are some of the important reasons why charter schools specifically should consider energy efficiency and green building.

- Energy efficiency and green building can have a positive affect on student health and academic performance:
  - Poor indoor air quality can affect students' health and ability to concentrate. Air quality can be improved through better ventilation and use of paints, carpets, and adhesives that have limited or no volatile organic compounds (VOCs), ad well as formaldehyde-free wood (DOE 2002b).
  - There is evidence indicating that students learn better in settings with daylighting, one of the most highly-promoted energy efficiency options for schools. Research shows students attending highly daylit schools outperform students in schools with limited daylighting by 5-18% (Plympton, Conway, & Epstein 2000). Daylit schools in Johnston County, N.C. have seen student performance at two daylit schools rise 11.1% and 17.5% above the county norm (DOE 2002b).
  - Daylit buildings may be healthier for students, improving students' concentration, ability to cooperate, and potentially impacting physical growth (Plympton et. al. 2000, p. 1).
  - Attendance rates are 3% above the county average at energy efficient and daylit Durant Road Middle School in Raleigh, N.C. (DOE 2002a), and Plympton et al. (2002) found that students in classrooms lit with full-spectrum lights may be absent less than those lit with conventional lighting.

- "Green" or energy efficient technologies in school buildings can be incorporated into the curriculum, providing unique, hands-on education around energy issues.[12] The Alliance to

[12] North Carolina policymakers recognize this potential: "The Energy Policy Council strongly recommends that students should be exposed to working energy technologies in their school buildings. Daylit rooms, state-of-the-art heating and cooling systems, solar water and space heating devices, renewable electricity systems, and a variety of innovative energy efficient construction products are examples of the technologies that are important to install in school buildings throughout the state (SEO & ASUEC 2005, p. 69)."

Save Energy's Green Schools Program offers numerous resources for schools to incorporate "green" or energy efficient building technologies into the curriculum. Roy Lee Walker Elementary School in McKinney, Texas has above-ground cisterns that collect rainwater for irrigation, with a gauge that allows students to monitor the water collected (SHW No date). The school also monitors energy and water conservation systems and shows them on the school weather station (Innovative Design No date(b)).

- A school's facilities can be a real source of pride, and green or energy efficient buildings can offer the school a positive image in the community and could be helpful in attracting students.

- Educational buildings have a long expected lifetime, longer than most commercial building types. The median life of an educational building is 66 years, compared to an average commercial building lifetime range of 48 to 58 years (D&I International 2005). Only warehouses have median lifetimes as long as educational buildings. Although the charter school movement is too new to estimate how long these schools will stay in their facilities, they will likely be in them for longer than the average commercial occupancy, and the majority of Self-Help charter school borrowers own their buildings.

Benefits of a Self-Help High Performance Charter Schools Initiative

Because of Self-Help's charter school lending niche and experience, the cost-savings potential that could improve school cash flow and lower Self-Help's lending risk, and the unique non-financial benefits of high performance building that accrue to schools and students, this presents a practical opportunity for Self-Help to engage in an energy efficiency initiative with a strong mission fit. If successful (if Self-Help is able to quantify accrued benefits to borrowers that are deemed to be of greater value than the additional staff time required), a charter school energy efficiency initiative could serve as a pilot for a larger initiative that would reach across all of Self-Help's commercial lending activity. It provides a forum for loan officers and other lending staff to acquire an in-depth knowledge of energy issues as it relates to one sector. These new staff "specialists" would be able to provide assistance to other commercial loan officers as the energy initiative expanded.

"Triple-bottom line" (TBL) investing, which balances social, economic, and environmental goals, is a growing trend in the financial world. Self-Help has had a sustainable component to its commercial lending for some time, including a special recycling loan fund and focus on "smart growth" lending in downtown and distressed urban areas. However, other CDFIs such as Shorebank Pacific and Coastal Enterprise, Inc. have more established programs and greater recognition for their combination of environmental and social mission. The Reinvestment Fund, a Philadelphia-based CDFI and charter school lender, offers energy conservation loans to charter schools at a reduced interest rate (TRF 2003). To remain competitive as an investment institution and a model in community development lending, the organization must begin to implement and promote new "green" initiatives that are in line with its social mission. The strong mission fit of high performance charter schools, as well as the size of the individual loans (average loan size of over $1 million) makes this an ideal avenue to pursue and aggressively promote new energy around sustainable lending. Self-Help's participation in the new CDFI Triple Bottom Line Collaborative offers an opportunity to promote new programs, as well as receive advice and possibly form partnerships with other lenders.

The research for this report discovered a surprising lack of information that discusses high performance facility issues with a specific focus on charter schools—most focus on traditional public schools or school districts. Given the numerous differences in facility size, scope, and funding between charter schools and traditional public schools, deducing the applicability of available information to charter schools is not always easy or straightforward. Any significant resources produced or information uncovered could be beneficial to the charter school movement, regionally or even nationally. Self-Help is actively involved in the charter school field, which presents an information-sharing opportunity whose benefits could extend well beyond Self-Help's borrowers, while simultaneously presenting a great marketing venue and opportunity to frame Self-Help as an environmentally-conscious lender.

Initiative Design & Implementation Considerations

To be a successful Self-Help pilot program, any high performance charter school initiative must be accomplished with as few burdens as possible on borrowers, Self-Help loan officers and support staff. This section addresses some considerations that should be incorporated into initiative design in order to provide the most relevant information and largest benefits to Self-Help borrowers.

- Some charter schools do not approach Self-Help until they are well into the construction planning process, which could make it more burdensome or entirely unrealistic for staff members to make suggestions on the building's structural detail or whole building systems. Many of the resources on high performance schools focus on the need to consider high performance objectives from the beginning in order to keep costs down. Any Self-Help resources or partner referrals must acknowledge that this may not be feasible for some borrowers. However, some of the recommendations listed under the section "Minor Renovation and Late Incorporation" on page 39 may still be applicable, and borrowers could still be provided with information on ways to conserve energy through the choice of office equipment and operations and maintenance. In addition, many borrowers develop their facilities in stages as they expand student enrollment, and introducing high performance concepts early provides such schools with time to consider incorporation into later Self-Help-funded construction projects.

- Because of the lack of state funds for charter school facilities, most charter schools (including those in North Carolina) must make debt payments for facilities out of their operating budgets, which are already fairly slim. Some schools may only be able to consider options that have the same capital costs as standard building or equipment options, unless creative underwriting options are explored. In order for Self-Help to feel comfortable with a higher loan amount, predicted energy cost savings must be reliable and well-documented.

- Because charter school facility projects are typically smaller than the average public school, they cannot benefit from the economies of scale that some larger public school projects see. For example, a sacrifice in building material quality can have an impact on total cost that for large schools ($15-$20 million) can compensate for most or all of the added cost of high performance systems. Because many energy efficiency components do not see the same benefit of scale as building materials and other construction costs, small charter schools may not acquire the same net benefit from some energy efficiency options as larger schools (Davis 2005).

- Typically, the school's facility is the only collateral a borrower has available. Although the Kauffman Foundation study demonstrated that the school building market may not be as grim as some have estimated, the demand for a used school building will vary widely by market, and resale concerns are still a real risk consideration. While there is evidence that energy efficient homes can fetch a price premium based on energy savings, the same may well not be true for a weak school buildings market. There may be loan-to-value issues if the building value will not increase in proportion with added costs of energy efficient or green components.

- Self-Help lends to charter schools in several states besides North Carolina, which have different charter school laws, facility funding options, and availability of programs and financial incentives to encourage energy efficiency and green building. In addition, the climate across the Self-Help lending region is varied, and not all energy improvement options will make sense for all borrowers. The wide lending area introduces some complexities, and increase the quantity of information with which loan officers and construction specialists should be aware in order to provide appropriate information to all borrowers. Fortunately, the North Carolina Solar Center manages the Database of State Incentives for Renewable Energy (DSIRE), which includes information on all state and federal programs and incentives to encourage renewable energy and, as of this spring, energy efficiency. While the level of technical detail is not extensive, the Department of Energy produces a series "Energy Design Guidelines for High Performance Schools" designed for seven unique climate zones in the U.S., including three zones in Self-Help's target lending states.

- Many borrowers are new to the development and finance processes and can become overwhelmed at the quantity and detail of information already required by Self-Help. Understanding the multitude of energy efficiency options can be overwhelming, as can analyzing payback scenarios and verifying the qualifications of contractors and other professionals. Some staff have commented that Self-Help feedback is already sometimes seen as onerous, particularly on charter school construction loans, although other staff members note that this varies widely by borrower and that some appreciate Self-Help suggestions. However, it is important to consider that additional questions or suggestions may incur negative reactions from borrowers, and staff should use their discretion in making recommendations based on the nature of the relationship with a borrower and receptiveness to unsolicited Self-Help technical assistance.

- One key component of program success is the availability and identification of qualified architects, engineers, and contractors to design high performance school facilities. Because borrowers may not have knowledge of local resources and professionals to perform the work, Self-Help may need to provide this information. This could present possible liability concerns, depending on the level of Self-Help involvement and specificity. To the extent that multiple suggestions can be provided or referrals made to outside resources listing qualified professionals, much of this liability can likely be mitigated. However, the feedback of in-house attorneys on the development of referral standards for this purpose could be beneficial.

- Whether hypothetical examples in marketing materials or case-by-case specifics prepared for individual loan applicants, loan officers may struggle explaining investment payback periods. A simple payback timetable is much easier to understand and explain than an analysis that takes into account the time value of money, but it is also less accurate. A simple payback chart would skew financial returns upwards, particularly for those with long payback periods. Despite its relative complexity, net present value (NPV) calculations are important for larger investments, those with marginal returns, or those with long payback periods.

- Although there is a good deal of energy and excitement among several Self-Help staff members to implement some form of a high performance schools initiative, the project does

not live with one person and most lending staff have little free time to dedicate to the implementation of such a program. The final initiative design should consider the lack of staff time to dedicate to the project, yet the responsibility for keeping the initiative active and maintaining key outside contacts should be assigned to a single staff member.

OPPORTUNITIES & RECOMMENDATIONS

Based on the considerations listed above, this section outlines several specific strategies that Self-Help's charter school lending team should undertake to promote high performance facilities among borrowers and the greater charter school community. Suggestions include the development of informational resources for borrowers, technical assistance from construction advisors, consideration of a special lending program, and staff development to increase awareness and understanding of the issues and objectives.

Borrower Resources

Developing resources for borrowers in the form of pamphlets or other informational materials would be the easiest strategy to develop and maintain, yet could still produce a real benefit by introducing key opportunities to borrowers.

<u>"Best Bets" Pamphlet</u>
I highly recommend that Self-Help develop one or more "best bets" pamphlets that summarize the most cost-effective energy savings opportunities and strategies that have the largest impact on student health and performance. Schools can take the recommendations to their project architect, or, to the extent that staff expertise is developed, utilize Self-Help construction technical assistance to determine whether desired strategies are appropriate for their facilities. Depending on the detail of the Self-Help resources, it may be feasible for a school to introduce these concepts to their current architect if they have already contacted with one, rather than limiting schools to identify an architect with experience in the area (although this would always be preferable when possible).

An additional benefit of this type of resource is that it could be provided to a larger charter school audience through a charter school association or other marketing distribution mechanism, reaching administrators of some expanding schools before they begin planning for permanent facilities and possibly influencing their decision to plan for a high performance building. In this way, Self-Help could have an impact beyond its borrowers.

A basic pamphlet could be developed based in large part on the information in this report. However, I recommend contracting with a professional firm or individual with extensive experience in the area of high performance school design who can identify the relative importance of different options and develop a detailed estimate of initial cost and savings potential. There are a few potential local partners.

- Raleigh-based Innovative Design is one of the nation's leading experts in high performance school design. Innovative Design offers its services as an architect for individual schools and as a consultant to other project architects. Most of Innovative Design's experience is with public schools that have capital for facilities construction and for relatively large projects

(typically over $6 million). However, the firm has designed facilities for or consulted with a few small schools, which due to their more limited budgets face some of the same challenges of scale as small and start-up charter schools (Davis 2005).[13] Innovative Design Principal Michael Nicklas presents annually at the North Carolina Charter Schools Conference, and the firm is familiar with the issues presented by small facilities budgets. In addition to direct design and consulting work, Innovative Design has prepared high performance school building guidelines for use throughout specific school districts and states, and helped develop the national series "Energy Design Guidelines for High Performance Schools" published by the U.S. Department of Energy.

The firm's extensive experience and reputation in this area is appealing. However, Self-Help should consider that the firm typically focuses on larger project than Self-Help's average charter school borrower and has a heavy emphasis on complex whole-systems approaches to building design including extensive daylighting strategies. If considered as a potential partner, Self-Help should verify that they have the ability to identify resources for charter schools with smaller facilities, more limited resources, and those that are considering high performance options relatively late in the development process.

- DTW Architects and Planners, Ltd. has an established relationship with Self-Help, having been the designer for a couple Self-Help building renovations, including the office of the Self-Help affiliate the Center for Responsible Lending (CRL) in downtown Durham. The CRL building incorporates several high performance building components, including two daylighting technologies. DTW has experience in school design, including some with high performance features. The firm has a very positive reputation with Self-Help's construction advising team and appears to have a very practical approach to incorporating cost-effective high-performance features. DTW architect Robert Sotolongo is LEED certified, and has built on his knowledge of LEED and green building practices to develop a sustainable design guideline specific for DTW's uses. An important benefit of partnering with DTW is the established relationship and reputation at Self-Help, and experience in green school design. However, the firm is not experienced in developing guidelines for outside parties and may not have an extensive internal knowledge-bank of specific technology descriptions, initial cost and energy savings of various strategies, and quantified examples of successful incorporation in other projects that can easily be pulled from.

- The North Carolina Solar Center (NCSC) at North Carolina State University has a number of experienced professionals on staff that provide energy efficiency and renewable energy technical assistance. Building Programs Manager Dona Stankus, for example, is a licensed and experienced architect who has experience in school design and a strong interest in green building. NCSC maintains a Green Building Technology Database, an online searchable list of North Carolina building projects that have incorporated green or energy efficient technologies. NCSC is currently developing a pamphlet on high performance portable classrooms, and seems keenly aware of concerns of first-cost and length of payback periods. The Center would consider working with Self-Help on developing resources for borrowers. One benefit of partnering with a public agency is that it would limit potential concerns over preferential treatment or endorsement of a single design firm. Additionally, NCSC offers free and low-cost technical assistance on energy efficiency and renewable energy issues and

[13] Schools include Sterling Montessori in Cary (began work with the school before it became a charter), a Charlotte-area school that has since converted to a charter, and Montessori Community School in Durham.

could be a key referral partner. However, the Center is also limited in its ability to provide recommendations of or referrals to private design and construction professions, which could be a helpful function of a program partner as Self-Help navigates the local landscape.

In choosing a professional to develop such a resource, Self-Help should consider the organization's or individual's:

- Understanding of and sensitivity to charter school financial constraints;
- Familiarity and experience with smaller schools and schools independent of school district funding and facilities expertise;
- Understand that due to varying times of Self-Help contact in charter school's development process, not all schools will be able to look at comprehensive high performance building design and other opportunities need to be presented;
- Understand Self-Help's role as a lender, and the limited extent to which Self-Help is willing and able to recommend or get involved in very specific construction decisions.

In addition, the partner should be able to develop a resource with the following specifications:

- Specific recommendations appropriate for different types of construction, including new construction, major renovation, minor renovation and incorporation late in the development phase, as well as modular and portable building considerations if possible. Partners with knowledge and experience appropriate for creating a resource on operations and maintenance considerations would be ideal.
- Resource should include a range of average upfront costs, energy savings, and payback periods for each recommendation.
- A summary of non-financial benefits of each recommendation should be provided, or supporting materials referenced.
- A supplemental resource with more detailed technical and cost information, with resources for additional information, would be ideal.

<u>How to Choose an Experience Professional</u>

The Sustainable Buildings Industry Council (SBIC) has created list of questions that schools desiring high performance building components should ask of prospective architecture and engineering teams to determine whether they have the necessary experience and expertise to produce desired results. The questions are categorized by 17 building components and process (including commissioning, daylighting, building shell, life cycle cost analysis, and indoor air quality), which allows schools to easily identify appropriate and specific questions based on preferred building design options. For a full list of questions, see SBIC publication "High-Performance School Buildings: Resource and Strategy Guide" (SBIC 2005). Based on SBIC recommendations, some of the key pieces of information a school should acquire from a prospective architecture and engineering team include:

- Specific strategies the team has used to achieve desired design and performance
- Experience applying strategies to school buildings
- Familiarity with school operations and maintenance systems and practices
    - Experience designing schools in a way that minimizes long-term operations and maintenance expenses
- Previous projects that incorporate proposed strategies
    - Satisfaction of previous clients
    - Performance and energy savings of completed projects
- Knowledge and experience in specifying, procuring, and installing desired materials

- Typical strategies used to ensure indoor air quality, and visual and thermal comfort
- Whether specification of high performance systems is standard practice
- How life-cycle costs are considered
- Analysis tools used, and specific tools proposed for the given project

There are a number of publicly-available directories of experienced green building professionals, and Self-Help could easily develop a list of these resources to provide to interested borrowers. A couple options include:

- *The North Carolina Green Building Technology Database*. Maintained by the North Carolina Solar Center, this searchable online database lists green building projects completed in the state by building type, and included detailed information on specific technologies used. The names and contact information for each project's architects, engineers, and other development professionals is included.
- *LEED Accredited Professionals*. The U.S. Green Building Council maintains an online list of all LEED certified professionals, searchable by location and discipline.

Technical Assistance

Many borrowers already have an architect when they approach Self-Help, who may not have extensive knowledge of energy efficient and green building options. While well-designed and detailed informational resources should help to introduce schools and their design team to these concepts and technologies, Self-Help construction advisors could be a valuable resource in helping schools incorporate recommendations into their construction plans. To offer a real value-add to borrowers, the construction staff should boost their familiarity with high performance building options. LEED professional certification is one option. The certification process requires an intimate familiarity with the LEED green building criteria, and could be a good way to gain a familiarity with some of the key issues. LEED is currently the most widely recognized green building standard, and LEED certified staff could add real credibility to a Self-Help high performance schools initiative.

The benefits of LEED certification likely outweigh the direct costs (such as fees for the study guide and exam), but preparing for the exam can be very time consuming. In addition, the certification is focused around a single set of assumptions and processes for green building, and some professionals have critiqued it as having too narrow and inflexible a focus. However, LEED still appears to be a good option for professional development and marketing purposes. Although Self-Help should be open to other alternatives, I have not been able to identify equivalent certifications or educational opportunities.

Lending Program

Ultimately, the best way to have a significant impact on the energy efficiency of charter schools would be to provide a loan program that offers a reduced interest rate for the energy efficiency or green portion of a construction loan, or special underwriting flexibilities. This is the real "push" opportunity to get borrowers to seriously consider energy efficiency. If cost-savings can be identified not only in long-term energy savings but also in financing cost, Self-Help may be able to offer a very real financial benefit to struggling charter schools. This is not a unique concept. The Reinvestment Fund offers below-market interest rates on the costs of a number of approved cost-effective energy

efficient technologies to charter schools and other nonprofits (TRF 2003). Depending on the level of interest rate reduction and the cost-effectiveness of the improvements, a lower rate could be justified on the basis of the lower risk associated with reduced operating costs. A more highly discounted rate or one that achieved indoor air quality rather than cost-saving objectives could be justified due to high mission fit.

Self-Help's general lending philosophy is to provide access to financing for businesses who have no other alternatives, in a manner that maintains a high level of Self-Help financial self-sufficiency and adequately compensates the organization for lending risks. Low-cost financing is not typically the objective. Consideration of cheaper rates for energy efficiency loans would require more internal analysis of program objectives, and likely an outside source of funds to help subsidize the program as well. However, given the numerous benefits of energy efficiency and green building in the charter school sector, and the role a low-cost lending program could play in motivating schools to consider energy efficiency, it is worth further exploring staff interest in such a program.

Conversations with senior lending staff indicate that this possibility is not out of the realm of consideration if there is a quantifiable benefit of such a product, as well as adequate funding to compensate for administrative costs and lending risk. Self-Help should do more research, such as surveying current borrowers and other target audiences, to determine whether cost of capital would induce them to consider energy efficiency. To mitigate concerns that schools would apply for an energy efficiency loan simply due to the low-cost of capital but could access financing elsewhere, the organization should consider measures to prevent such as occurrence. For example, Self-Help could include a requirement that a borrower must have been turned down for funding elsewhere if they are applying for the below-market funds, or that the energy efficiency component can only be utilized as part of a larger construction or renovation loan. Staff should begin to explore funding possibilities or program partners, to determine whether financial support is available for such a strategy.

Charter schools are eligible for North Carolina's State Energy Improvement Loan Program (EILP), run out of the State Energy Office (SEO). The EILP offers loans at 3% interest rates for energy efficiency and renewable energy projects. The loan program has seen relatively little activity, and Self-Help should explore the reasons for the limited utilization and determine whether it would be realistic for charter schools to take advantage of this opportunity. In the absence of a special Self-Help loan product, this could be an opportunity for charter schools to take a second low-interest loan from the SEO for any energy portions of the project, reducing their overall financing costs and their ability to incorporate energy efficiency components into their facilities. A preliminary survey of loan programs in other target lending states did not uncover any similar programs for which charter schools are eligible, although there are still some opportunities for more in-depth research.

Staff Education

To boost staff energy and interest in a high performance schools initiative, and to increase staff ability to discuss benefits and recommendations with borrowers and other charter school stakeholders, Self-Help should organize a handful of staff educational opportunities.

<u>In-House Training & Education</u>
As an introduction to the key benefits and opportunities in high performance school design, Self-Help could invite an experienced professional to the central office for a lunch-time brownbag

discussion, for the charter school lending team specifically or the organization as a whole. Innovative Design president Michael Nicklas presents annually at the North Carolina charter schools conference and has some familiarity with charter school issues. Other architects who have designed high performance schools in the state such as DTW are also possibilities and could speak to specific projects. Architects with experience in charter school design would be ideal. A separate or a co-presentation with a school administrator who can speak to the energy savings benefits, as well as operations and maintenance benefits and challenges of certain technologies, would also provide a useful perspective.

Field Trips

Seeing these concepts and technologies in action is probably one of the best ways to familiarize staff with the issue. Fortunately, North Carolina has a number of schools that have received national recognition for their design and performance.

- Johnston County, N.C. has built four daylit schools since 1990, and has seen a dramatic increase in student performance, 11% to 17% above the county average (DOE 2002, p. 81). In addition, annual energy costs are $0.32 cents per square foot below the county norm. There are two schools in Clayton, N.C., which is less than an hour from Self-Help's Durham office. This would be a great opportunity to see daylighting in action, and hear from school administrators, teachers, and school district officials about the benefits of daylighting. Also, given that these are older projects, the Clayton schools should be able to speak to any maintenance challenges and long-term costs and savings that result from daylighting.
- Durant Road Middle School in Raleigh has received national attention for its extensive daylighting and resulting energy savings. The school has also enjoyed a very high student attendance rate, which is attributed in part to the daylighting.
- The North Carolina Green Building Technology Database includes a list of schools that have utilized green and energy efficient technology, including a number of schools in Wake County and one in Chapel Hill. If in close vicinity, Self-Help could arrange to visit several schools that are utilizing different technologies and vary in size and scope.

APPENDIX A

ENERGY SUPPLY & COST

The financial benefit of energy efficiency for Self-Help borrowers depends in part on the cost of energy: natural gas, petroleum, and electricity (the price of which is determined partially by its input fuels). Although it is not clear to what extent decisions to invest in energy efficiency are dependent on energy costs, future price estimates should factor into any analysis of the financial costs and benefits of an energy efficient investment. While a lender may choose to finance energy efficiency for any (or all) of the number of benefits discussed previously, the anticipated future energy costs (and savings) will be the focus of many individual investment and financing decisions.

FUEL SOURCES

To understand how energy price forecasts affect residential and commercial consumers, we must look at which fuel sources they are dependent on. Changes in the price of fuel used to generate electricity have an impact on consumers in two ways: increased retail prices of fuels such as natural gas that are used by the consumer directly (such as gas heating), and increased retail prices of electricity that result from higher cost of fuels used for generation.

Figure A.1 is a breakdown of 2001 estimates of net residential energy consumption by source, for the state and the country.[14] We can see that residential consumers are primarily dependent on electricity, in greater proportion than the national average. Natural gas and petroleum each represent around 20% of residential energy consumption in North Carolina, with wood representing a small fraction at 4%.

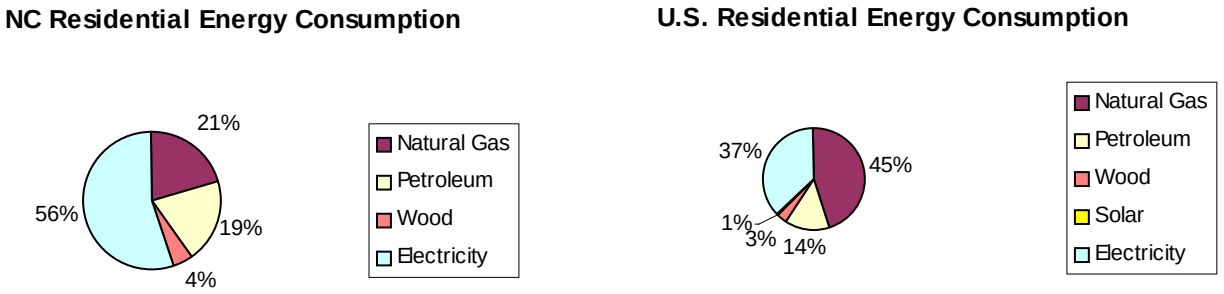

Figure A.1. Energy Consumption Estimates by Source, North Carolina & United States. Source: Energy Information Administration 2004, State Energy Data 2001 Consumption, Table S4.

[14] Coal and geothermal represented well below one percent of consumption both statewide and nationally and are excluded here. Solar supplied a very small fraction of residential energy in the state, although nationally it represents just over one half of one percent.

North Carolina commercial operations are also much more reliant on electricity than is true nationally (**Figure A.2** and **A.3**), and consume only about half as much natural gas. Therefore, overall the commercial sector will be less sensitive to changes in natural gas prices than to retail electricity prices.

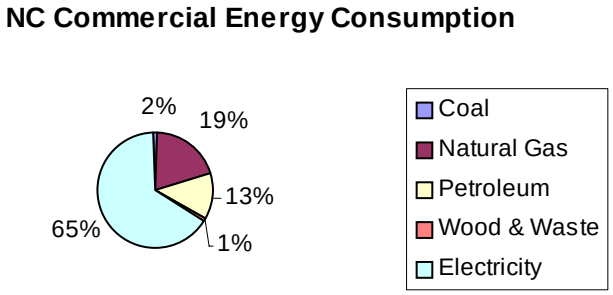

Figure A.2. Energy Consumption Estimates by Source, North Carolina & United States. Source: Energy Information Administration 2004, State Energy Data 2001 Consumption, Table S5.

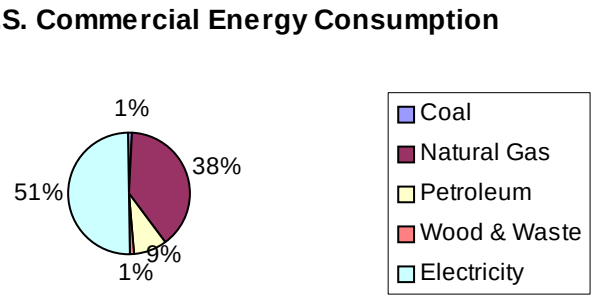

Figure A.3. Energy Consumption Estimates by Source, North Carolina & United States. Source: Energy Information Administration, State Energy Data 2001 Consumption, Table S4.

There seems to be a general public perception that energy costs will continue to rise, based in part on experience with recent price spikes in oil and gas.. However, the federal Energy Information Administration (EIA), the statistical arm of the U.S. Department of Energy, anticipates that most conventional fuel prices will begin a decline in the next few years (EIA 2006). [15] The downward price trend for most energy sources is expected to continue for eight to ten years, after which prices will rise gradually through 2030. **Figure A.4** shows the forecasted prices of electricity and primary conventional fuels through 2030.

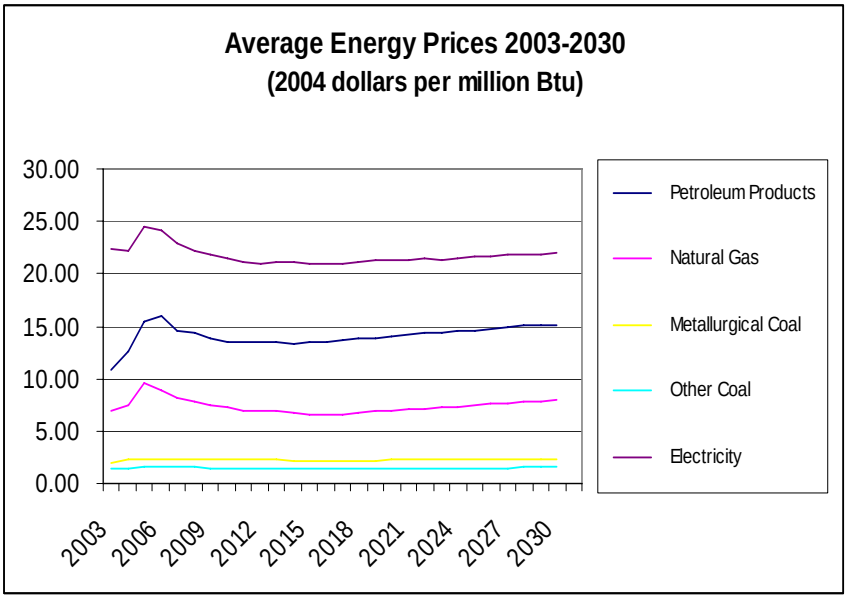

Figure A.4. Source: Energy Information Administration 2006.

[15] The EIA produces the Annual Energy Outlook (AEO) each year, which evaluates trends in energy supply and demand, including future price estimates for conventional and renewable fuels and electricity. While there are a number of research firms that produce proprietary reports on energy trends, experts in the field verified that the EIA is considered the definitive source for energy forecasts. Of course, these estimates must be taken with a grain of salt: forecasts are very tricky, and the EIA's research could be tainted by political biases or outside pressures. The numbers used here are based on the 2006 AEO "reference case," or the EIA's base scenario. The EIA also considered scenarios of higher and lower economic growth and oil prices.

Retail Electricity

The EIA projects that average national delivered electricity prices for all sectors will drop from 8.3 cents per kilowatthour (kWh) in 2005 to 7.1 cents/kWh in 2012 (EIA 2006 Table 8), due to primarily to a decline in natural gas prices, with a secondary influence of declining coal costs.[16] Prices will hover between 7.1 and 7.2 cents/kWh through 2018, then rise gradually to 7.5 cents/kWh in 2030 (EIA 2006 Table 8). **Figure A.5** illustrates the projected retail price trends for the residential and commercial sectors. [17]

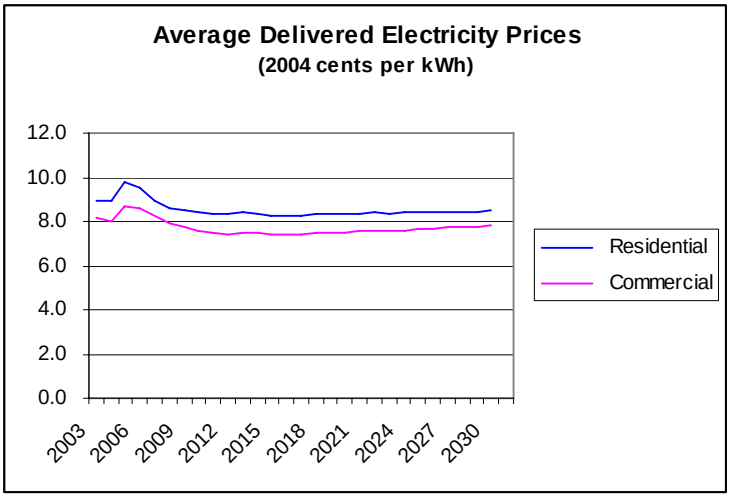

Figure A.5. Source: Energy Information Administration (EIA) 2006 Table 8.

In North Carolina, average retail electric prices for the residential and commercial sectors were below the national averages in 2003 (EIA 2005a). The residential rates were higher than the average for the South Atlantic region, and the commercial rates were just under the regional average. Despite the lower rates, North Carolina households had average monthly electric bills almost $12 greater than those nationally, although commercial bills were significantly lower than the national average. **Table A.1** provides additional detail.

Table A.1. Comparison of 2003 Average Electricity Prices and Monthly Bills
(Prices in dollars; rates per kWh)

	Avg. Residential Electric Rates	Avg. Residential Monthly Bills	Avg. Commercial Electric Rates	Avg. Commercial Monthly Bills
North Carolina	$0.0832	$90.56	$0.0665	$400.81
South Atlantic Region[18]	$0.0810	$92.59	$0.0670	$464.41
United States	$0.0870	$78.84	$0.0798	$479.73

Source: Energy Information Administration (EIA) 2005, Tables 1 & 1d.

[16] Because North Carolina is less dependent on natural gas than coal, electricity prices may not follow the same trajectory as national prices which are more natural gas sensitive (see **Figure A.6** for electricity generation fuels).

[17] Industrial rates are significantly lower than commercial and residential rates (5.1 cents/kWh in 2003), contributing to the lower average rates across all sectors. Interestingly, EIA forecasts that industrial rates will be higher in 2025 than in 2003, at 5.4 cents/kWh.

[18] South Atlantic Region includes North Carolina, Delaware, DC, Florida, Georgia, Maryland, South Carolina, Virginia, and West Virginia.

Electric Generation Input Fuels

Retail electricity prices are affected in part by the cost of fuels used for generation. **Figure A.6** provides a breakdown of the fuel inputs that supplied electric power generation in 2001.[19] Although natural gas currently plays only a very small role in state electricity generation, some experts predict that natural gas will supply most of the new electric demand through 2020 (Beck et. al. 2001, p. 58). Of course, this may have changed with recent price spikes.

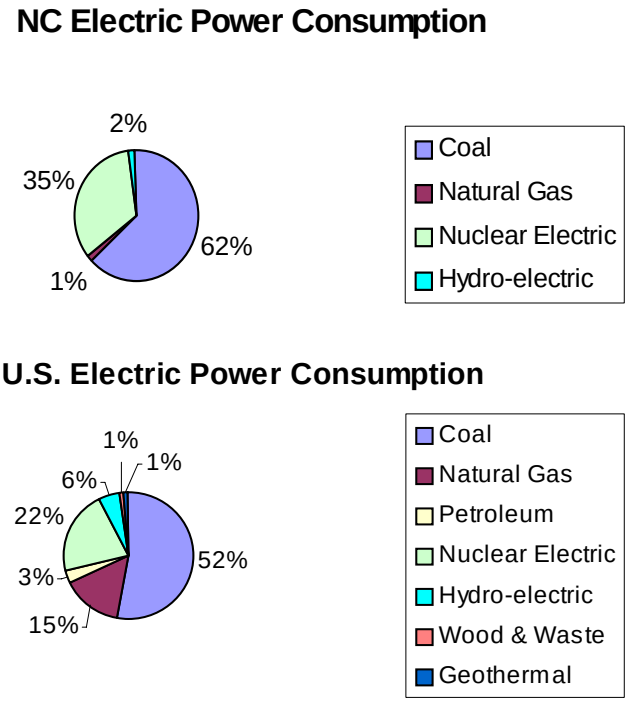

Figure A.6. Energy Consumption Estimates by Source, North Carolina & United States. Source: Energy Information Administration 2004, State Energy Data 2001 Consumption, Table S8.

Coal

Coal prices are expected to increase slightly through 2008, to $21.87 per short ton from the current price of $21.20. Prices will then begin a steady decline through 2016 as a result of increased mine productivity and a shift towards lower-cost coal, bottoming out at $20.09 per ton (EIA 2006). As a result of rising natural gas prices and increased demand for coal-fired power plants, coal prices will then rise slowly to $21.73 by 2030 (EIA 2006).

The state is heavily dependent on coal for electricity production. While coal prices are much less volatile than natural gas prices, North Carolina's 14 coal-fired power plants have a negative impact on natural ecosystems (SEO & ASUEC 2005, p. 18). In 2002, North Carolina ranked 8th in utility electricity retail sales, and ranked 9th, 11th, and 13th in emissions of sulfur dioxide, nitrogen oxide, and carbon dioxide respectively (EIA 2004). Duke Power, one of the major utility providers in the state, "tries to operate its nuclear plants at close to full capacity… which means that the marginal change in our use of electricity typically comes from burning coal" (Kincaid 2006, p. 9). Reductions in electricity use could have a real impact on North Carolina air quality.

Nuclear

EIA projected nuclear fuel costs would rise approximately 50% by 2025 (EIA 2005b, p. 90). However, nuclear fuel costs are relatively inexpensive, currently around 4 mills (4/1000 of a dollar) per kilowatthour. Operations and maintenance costs represent a larger percentage of nuclear energy production costs than for other fuels.

[19] Geothermal, solar, wind, petroleum, and wood & waste were excluded from North Carolina totals due to their very minor roles in electricity generation. Solar and wind were also excluded from the U.S. chart due to minimal representation (well below one percent).

Natural Gas

While natural gas currently fuels very little electricity generation in North Carolina, it is projected to generate most of the new electricity required to satisfy an expected 2% per year increase in demand (Beck et. al. 2001, p. 58), potentially making retail electricity prices more sensitive to gas price fluctuations. Nationwide, the share of electricity generated by natural gas is expected to increase from 16% to 24% from 2003 to 2025, due its higher efficiency (EIA 2005b, p. 90).

The EIA projects that the wellhead price of natural gas will soon begin to decline due to new supplies and import sources, falling from an average of $7.62 per thousand cubic feet (mcf) in 2005 to $4.46/mcf in 2016. It is expected to then rise slowly to $5.92/mcf in 2030. The Lawrence Berkeley National Laboratory (LBNL) since 2001 has compared the AEO natural gas price forecasts to the New York Mercantile Exchange (NYMEX) natural gas futures contracts. While pricing is different and the researchers have shown that the NYMEX futures command a premium well over EIA forecasts, the futures also anticipate a decline in natural gas prices through 2010 (Bolinger and Wiser, 2005).[20]

Retail Natural Gas

Retail natural gas prices will follow the trends outlined for wellhead gas above. Delivered prices will fall from $9.89 per thousand cubic feet (mcf) in 2005 to $6.78/mcf in 2016 (in 2004 dollars) (EIA 2006 Table 13). Prices will then increase gradually, reaching $8.22/mcf in 2030. This is substantially lower than average 2005 prices, yet higher than 2004 prices of $7.74/mcf.

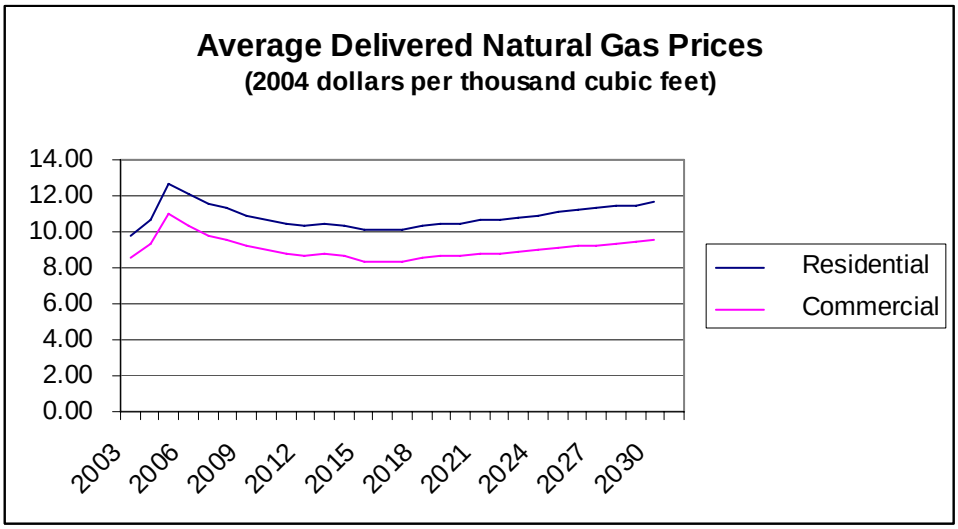

Figure A.7. Source: Energy Information Administration (EIA) 2006, Table 13.

[20] LBNL has found that the NYMEX futures trade for significantly higher prices than the EIA estimates for the same period (Bolinger and Wiser 2004). LBNL researchers Mark Bolinger and Ryan Wiser estimate the difference has averaged approximately $0.8MMBtu[20], or the equivalent of 0.5 cents per kilowatthour (Bolinger and Wiser 2004, p. 6). They note that while it may be that the AEO price estimates have "been biased downwards relative to market expectations," the price differential may represent a premium—the cost of locking in future prices (Bolinger and Wiser 2004, p. 6).

Retail Petroleum

Consumers that rely on petroleum for heat or other residential or commercial uses will see a similar trend. Prices will fall from current highs through 2013-2015, and then rise gradually. In 2030, the price of petroleum is projected to be even higher than expected 2006 peaks for all but residential distillate fuel.

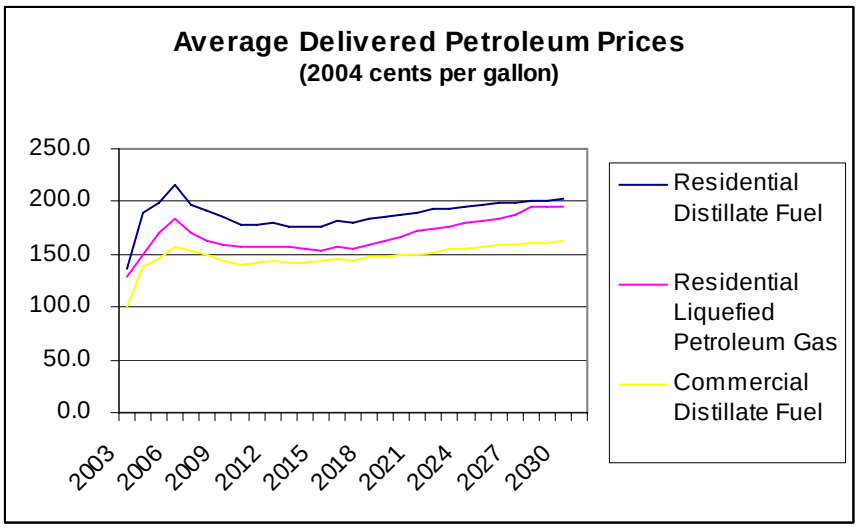

Figure A.8. Source: Energy Information Administration (EIA) 2006, Table 12.

ENEGY PRICE & ENERGY EFFICIENCY DEMAND

The demand for energy efficient technologies and buildings is partly based on expectations of future energy prices. However, how strong a role energy prices play in individuals' choices to invest in energy efficiency is unclear. Brad Foss interviewed a number of energy and efficiency experts in December of 2004 and found that there were conflicting opinions about the importance of energy costs in efficiency choices (Foss 2004). He reported that overall the rise in fuel costs did not instigate significant conservation efforts. Dallas Federal Reserve Bank economist Stephen P. Brown believes that demand is eight to ten years behind price changes. Foss said some executives claimed that while their companies have not modified energy conservation goals, price increases "may have facilitated getting financing for future programs" (Foss 2004).

Although Foss did not name all of the companies he interviewed, he appeared to have spoken primarily to and about large companies. The response of smaller business owners and individuals may be much different. Jim Placke of Cambridge Energy Research Associates did note that low-income families may make greater efforts to reduce energy costs (Foss 2004). However, Dan McFarland (2005) of the N.C. HealthyBuilt Homes Program said that "energy cost alone seldom motivate homeowners/buyers into making final purchasing decisions." McFarland noted that consumers also consider "comfort, durability, improved indoor environment and value satisfaction." More research on the price elasticity of energy, "tipping points" that spur a decision to invest in energy efficiency, and a better understanding of the myriad of other influences that motivate conservation and efficiency for both business owners and individuals would be very useful in better understanding the market for energy efficiency financing.

APPENDIX B

ENERGY EFFICIENCY PROGRAMS

As concerns over high energy prices and environmental impacts have increased, so have special programs to encourage consumers to reduce their energy consumption. This section lists nonfinancial programs sponsored by the State of North Carolina, the Federal government, and N.C.'s major utility companies; financial incentives such as grants, tax credits, and loan programs are listed separately in the specific chapters on commercial and home mortgage borrowers. Self-Help should be aware of these outside resources that are available to some borrowers, and provide referrals as appropriate.

NORTH CAROLINA PROGRAMS

Most of the state's energy efficiency programs and incentives are administered by the North Carolina State Energy Office (SEO), which was originally established during the Arab Oil Embargo in the 1970s to distribute fuel to "critical populations" (Shirley, No date). Since the 1980s, the office has been funded in large part by Petroleum Violation Escrow (PVE) funds, settlements from several major oil companies that violated federal price controls.[21] Unfortunately, these are expected to run out this year (Gabriel 2005). Although the SEO also receives up to $1 million annually from the U.S. DOE's State Energy Program (Shirley, No date), the SEO may be forced to scale back on some of its programs. Currently, there is no state budget appropriation for the SEO to help make up for this loss (Gabriel 2005).[22]

The SEO also helps to fund the other major provider of energy programs in the state: the North Carolina Solar Center (NCSC) at N.C. State University, which was established in 1988 to promote renewable energy, reduce dependence on foreign fuels, and decrease and stabilize energy costs to consumers. Despite a primary emphasis on renewable energy, the Solar Center also offers a handful of complementary energy efficiency programs. Finally, the N.C. Department of Health and Human Services (DHHS) administers the state's Weatherization Assistance Program (WAP), which is described in **Chapter 2**.

Healthy Built Homes

The N.C. Solar Center administers the North Carolina HealthyBuilt Homes Program (HBH), which certifies homes that meet criteria related to energy efficiency, indoor air quality, reducing materials waste, and other guidelines that promote a healthier home and environment. HBH provides technical assistance, trainings, marketing help, certification opportunities, and other services to home developers; the program is designed to help small and medium size home builders compete with the larger, more established green builders. The program is described in more detail in **Chapter 2**.

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[21] Petroleum Violation Escrow (PVE) funds provided about 86% of total SEO funding in the early 2000s (TBJ 2004).

[22] The North Carolina Energy Policy Council is responsible for overseeing SEO programs and policies, and if a major change will be required in SEO's priorities due to budget constraints, the Council would likely guide any policy change processes. According to the revised version of the 2003 North Carolina State Energy Plan, beginning in 2003 and 2004, "meeting the Energy Plan's recommendations has become the central direction of the SEO" (SEO & ASUEC 2005, p. ix). Thus, it is possible that any changes to SEO will be strongly influenced by findings and recommendations in the State Energy Plan.

Design Review
The N.C. Solar Center provides design review to individuals or businesses constructing homes or commercial/industrial buildings—helping to make buildings energy efficient, identifying potential areas to incorporate renewable energy, and identifying other sustainable design opportunities.

Manufactured Housing
The Energy Office partnered with East Carolina University to sponsor the Center for Energy Research and Technology that researches energy efficiency of manufactured housing. According to the SEO, one-third of new housing starts in North Carolina are manufactured and typically have winter heating bills of $400 per month or more (SEO No date). Inefficient electric furnaces installed in most manufactured homes are largely responsible for the high heating costs. The SEO offers incentive grants to help owners of manufactured homes replace their furnaces with more efficient ones. The could be a referral for homebuyers who utilize Self-Help's new manufactured housing mortgage product.

Waste Reduction Partners
Waste Reduction Partners (WRP), sponsored by SEO and the Land-of-Sky Regional Council, is a program that coordinates retired engineers who provide free energy audits and energy/waste reduction technical assistance to businesses, industries, and public institutions in Western North Carolina. Relying on a network of volunteers, WRP's 2005 budget was just over $150,000, but clocked over 12,400 hours of technical assistance and estimates nearly $2 million in annual energy cost savings for 2005's clients (Land-of-Sky 2005).

FEDERAL PROGRAMS

ENERGY STAR

In 1992, the U.S. Environmental Protection Agency (EPA) created the ENERGY STAR label to promote energy-efficient computers. Today, the ENERGY STAR label may represent one of the most recognizable energy efficiency standards in the market—more than 50% of consumers recognized the label in 2003 (EPA 2004, p. 14). The EPA claims that ENERGY STAR efforts contributed to energy savings of $7 billion in 2002, preventing greenhouse gas emissions equal to that of 14 million vehicles (EPA 2003, p. 1).

Appliances
The label may be best known as an energy efficiency standard for major household appliances and electronic equipment, which in 2003 covered more than 40 product categories and more than 28,000 individual product models (EPA 2004). The label is also applied to energy efficient light bulbs, such as compact fluorescents. Although many ENERGY STAR models are more expensive than standard models, all offer consumers a range of future energy savings.

Homes
Less well known is the ENERGY STAR label for new homes and commercial buildings that demonstrate a certain level of energy efficiency. The residential component of this program is described in more detail in **Chapter 2**. More recently, ENERGY STAR expanded into the home improvement sector. Utility companies and local governments in 11 states and cities currently offer

"Home Performance with ENERGY STAR," a "whole house" energy efficiency program for existing homes (EPA No date(a)). Qualified contractors perform a thorough home energy inspection and provide an evaluation with suggested efficiency improvements. The home improvement program is not currently available in North Carolina.

Commercial Buildings

ENERGY STAR has developed "Guidelines for Energy Management" for businesses that are committed to reducing energy use. In 2003, 13,000 organizations (including small businesses) were program partners, representing about 18% of the commercial building market (in floorspace) (EPA 2004, p. 18). EPA estimates that energy management practices have saved 55.7 billion kWh of energy to date (EPA 2004, p. 18). To evaluate energy use and performance, the EPA created a series of standardized measurement tools that are designed for each of several different types of primary building uses. Currently, the rating system is available for eleven difference space types, representing over 50% of the commercial space in the country (EPA No date(a)).[23]

Businesses in most categories must be a minimum of 5,000 square feet. The online "Portfolio Manager" rates building performance on a 1-100 point scale, which had evaluated nearly 19,000 buildings in 2003 (15% of those eligible at the time). Buildings scoring 75 points and above can apply for an ENERGY STAR building label. ENERGY STAR has also recently expanded into new building construction, by partnering with architecture firms committed to designing energy efficient buildings.

Million Solar Roofs

The Million Solar Roofs initiative is a public-private partnership administered by the federal Department of Energy, with a goal of one million solar roof installations by 2010 (DOE 2005a). Million Solar Roofs supports partners through grants and technical assistance to promote the initiative at the state and local level. Promoting the initiative locally is the North Carolina Million Solar Roofs Partnership and eight partner organizations serving 25 counties around the state (NCMSRP No date). In Durham, Clean Energy Durham is currently doing market research and designing an outreach program to promote solar hot water heating systems to different market niches of homeowners that could see the greatest benefit from installing a solar system.

UTILITY COMPANY PROGRAMS

In North Carolina, nearly 95% of electricity generated and sold in 2000 came from large investor-owned utility companies (IOUs). Duke Power serves about 1.7 million customers in the Piedmont and Western North Carolina, and Progress Energy serves more than 1.1 million in Eastern and Western NC (NCUC 2005). A third IOU, Dominion (formerly known as Virginia Electric & Power Co. (VEPCO)) also has a relatively small presence in the Northeastern part of the state, serving 115,000 customers in 2004 (NCUC 2005). The state also has 32 electric membership corporations (EMCs), which serve around 900,000 customers in 93 North Carolina counties (NCUC 2005 and SEO & ASUEC 2005). Finally, the state is served by 72 electric distribution companies owned by municipalities or universities (call Munis), with about a half million customers (NCUC 2005). The

[23] Space types currently eligible include: office buildings; hospitals; hotels/motels; K-12 schools; medical offices; supermarkets/grocery stores; residence halls; and warehouses.

North Carolina Utilities Commission (NCUC) regulates all utilities, although the IOUs are more heavily regulated than the EMCs and Munis (SEO & ASUEC 2005, p. 21).

For natural gas, the state is served by six regulated local distribution companies (LDCs), serving just over one million customers (NGD 2005). The three largest are Piedmont Natural Gas Company, Inc., North Carolina Natural Gas Corporation (NCNG) (a division of Piedmont), and PSNC Energy, while the others serve less than 1,000 customers each. There are also eight municipal gas systems that the NCUC does not regulate (NCUC 2005).

Energy Efficiency Initiatives

Below is a list of initiatives offered by the state's investor owned electric utility companies. The larger natural gas providers do not appear to have a strong interest in energy efficiency and other demand side management programs, based on the lack of services and resources listed on their website. PSNC Energy provides some information for customers on ways to cut down on energy costs, but Piedmont and its affiliate NCNG do not appear to provide any energy conservation information, and none of the three list energy efficiency financing or other services on their websites.

Financing Energy Efficiency

Some of the eligible uses of Progress Energy's Energy Efficiency Financing Program include energy efficient heat pumps, air conditioners, furnaces, insulation, duct improvements, and programmable thermostats. Loans are made at "preferred interest rates" to credit-qualified owner-occupiers of single-family one- or two-unit homes.

Duke Power's Energy Conservation Loan program offers financing for residential customers who own a single-family home, condo, town house, or manufactured home. Homeowners can borrow up to $10,000 for heating and cooling systems (including geothermal) or $3,000 for insulation, windows, or storm doors.

Rate Reduction

For owners of homes that have earned the ENERGY STAR label, Progress Energy offers a 5% reduction of each total monthly bill through its Energy Efficient Home program. Duke Power also offers slightly lower rates for residential customers with ENERGY STAR homes.

Time of Use Rates

All three IOUs offer optional time-of-use (TOU) rates for residential and some categories of commercial customers. TOU metering is a pricing system under which utility customers are charged rates higher than the standard rate during peak periods and lower rates during off-peak periods. While not an energy efficiency program, some customers could take advantage of TOU rates to help lower their energy costs, and reduce the pressure on the utilities to expand their capacity to satisfy markedly higher demand during certain times of the day. In addition, customers with solar energy systems that produce a greater quantity of electricity in the middle of the day could benefit from TOUs. Research has shown that most consumers with photovolotaic installations benefit from a net-metering/TOU system, although financial savings vary significantly with location (Hoff and Margolis 2004). It is not clear how widely the TOU rates are advertised; it appears that only Dominion provides information in the business section of its website explaining the reasons behind

rate prices and how commercial customers can lower their electric costs by reducing their peak usage.

Net Metering

Although not led by the utility companies, the North Carolina Sustainable Energy Association (NCSEA) and others are pushing for statewide net metering requirements. Net metering is a system that allows owners of small, on-site electricity generators (including renewable energy technologies) to subtract from their standard utility meter energy supplied to the system, and to only pay for the *net* energy used. Consumers are compensated for supplying excess electricity to the grid. Net metering can make the installation of some renewable energy technologies more financially viable, as it allows the owners of renewable energy systems to benefit from the systems' full capacity, not just the energy owners are able to use on site. This could decrease the payback period and guarantee a certain level of energy savings over time.

The state recently took a step towards net metering, when the North Carolina Utilities Commission (NCUC) issued an order in March 2005 that proposed a set of simplified interconnection standards for small distributed and renewable energy generation systems. Interconnection standards define how a distributed generation system may be connected with the utility grid to share excess energy.

APPENDIX C

INTRODUCTION TO THE TECHNOLOGY

Below is a brief introduction to some of the most common energy efficiency issues and technologies. The information is based in large part on resources available from the U.S. Department of Energy.[24]

BUILDINGS

Building Shell

Improving some building shell components (such as insulation) can be a very cost-effective way of improving energy efficiency. Major building shell components include:

- Insulation—installed in walls, ceilings, floors, and attics, it can dramatically improve the retention of hot and cool air generated by a building's heating and cooling systems, and can provide a more even inside temperature. Insulation is typically measured in "R-values per inch," with recommended R-values varying based on insulation location (floor, internal wall, external wall, etc.) and the region of the country in which the building is located.
- Windows—hot and cold air can also escape through windows, particularly older single-pane windows. Exact window recommendations vary by region (climate type). Installation of window shades or other coverings can also decrease the amount of heat exchange through windows, as can proper use of shades (keeping them open during winter daylight hours to increase warming by the sun, keeping closed as much as possible during the summer). Building owners should also take note of south-facing windows that receive the most sunlight, and in hot climates may want to consider window awnings to reduce direct summer sunlight.

Passive Solar

Passive solar design takes advantage of the sun as a source of natural heat and light, reducing energy costs for heating systems and artificial light. It includes a range of design components, from orienting buildings towards the south to take advantage of as much direct sunlight as possible, using heat-absorbing materials for the walls or floors, and windows designed to maximize direct sunlight in the winter and minimize it in the summer.

Daylighting is a form of passive solar design that uses daylight as much as possible to provide light to a building. Daylighting includes direct light via window and skylights, but good design limits glare through indirect lighting such as vertical skylights in propped-up roof extensions and reflectors to diffuse light. Some research shows that increasing the quantity of natural light in a building produces

[24] The U.S. Department of Energy has a number of information sheets and other resources with detailed recommendations for consumers looking to improve the energy efficiency of their home or business, available at: www.eere.energy.gov. A useful booklet on energy saving options for the home is also available for download at: www.eere.energy.gov/consumerinfo/energy_savers/.

positive psychological effects. A 2003 literature review sponsored by the U.S. Department of Energy and a variety of other parties found that lighting does have an impact on mood, although there is not one best lighting solution for all people or situations (Boyce, Hunter & Howlett 2003). The report concluded that daylight in a "conventionally windowless" retail space can increase sales. In addition, windows may positively impact the rental value of a nonresidential building. Daylighting is discussed in more detail in **Chapter 4**, in relation to school buildings.

BUILDING SYSTEMS

Heating, Ventilation, and Air Conditioning (HVAC)

Some heating and cooling systems are much more energy efficient than others, and often the extra cost of investing in an efficient system is more than paid back through energy savings. The best equipment will depend on the type of building and the heating and cooling requirements (such as whether the entire building or just a couple rooms need to be conditioned). In general, heat pumps that move warm air around a building are more efficient than furnaces and boilers, and unless just a small area needs to be cooled, central air is more efficient than individual room units. The ENERGY STAR label is applied to the most efficient equipment. Equipment should be serviced regularly to keep it running as efficiently as possible.

Ventilation can be an efficient way to cool a building, including natural ventilation or forced ventilation, such as fans. Ventilation also affects the air quality within a building. Whole-house fans are a good option for homeowners. Schools have particularly high ventilation requirements, which should be kept in mind when considering energy efficiency options for school facilities.

Geothermal Heat Pumps

Geothermal or ground source heat pumps are very energy efficient systems that can be used for heating and cooling. Geothermal heat pumps transfer temperatures between buildings and the ground underneath, which remains at a relatively constant temperature year-round (usually warmer than above-ground air in the winter, and cooler in the summer). The system is a series of pipes that use water, or a water and anti-freeze mix, that circulates to conduct the heat exchange. Regular building ducts are used to distribute the air throughout the building. Heat pumps are appropriate for both residential and commercial buildings.

Programmable Thermostats

Programmable thermostats can reduce energy use by ensuring that a room or building is only heated or cooled during the hours of the day when it is needed. More complex intelligent building controls integrate heating, cooling, lighting, and other building systems into one energy management system.

Ducts

Ducts that move conditioned air around a building are frequent sources of hot and cold air loss. According to Progress Energy, homes lose 20% of their energy via ductwork leaks, which proper sealing can reduce to nearly zero (Progress Energy No date). Building owners and occupants

interested in increasing building energy efficiency should make sure all ducts are properly insulated and check for leaks, particularly in unconditioned areas of the building.

Solar Hot Water

Solar water heating systems use a collector, typically on the roof of a building, to absorb heat from the sun. Flat-plat collectors are the most common, and consist of a flat, rectangular box with a transparent cover filled with tubing. Direct water heating systems run the potable water through the collector's tubes and deposit the heated water into a tank within the building. Indirect systems use a heat-transfer liquid to absorb the heat within the collector, and then water is warmed by running it through tubes within a tank filled with the hot fluid. The indirect system is necessary for regions with freezing temperatures. Some systems are "active" and use electric pumps (sometimes powered by photovoltaic panels) to move the water or fluid through the collector, while "passive" systems do not use a pump at all. To be most effective, solar collector panels should be installed on south-facing roofs that receive plenty of direct sunlight. payback period for solar hot water systems depends on the installation location and its ability to capture direct sunlight throughout the sunniest parts of the day and the amount of hot water used by building occupants.

Photovoltaics

Photovoltaic technology converts sunlight into electricity. Although individual photovoltaic (PV) cells can be used for small applications (such as powering a watch), for building use many PV cells are usually bundled together in one or more photovoltaic panels. Like solar water heating systems, the efficiency of a PV system is dependent in part on the amount of direct sunlight it receives. Because capital costs remain high, PV systems are not typically cost-effective. Over a 20-year period, electricity generated by a PV system will be at a cost of between 20 and 40 cents/kWh (significantly more than the average North Carolina 2003 retail electricity price of 8.3 and 6.7 cents/kWh for residential and commercial customers respectively) (DOE 2005b).

LIGHTING AND MAJOR EQUIPMENT

Lighting

Compact florescent bulbs (CFB) use only one quarter of the energy of incandescent bulbs and last about seven times longer. Switching to CFB and other energy efficient lighting technologies is a quick and easy way to reduce energy use. In addition, some households and businesses may want to consider sensors that limit use to only when needed.

Equipment

Energy efficient equipment, such as products that have earned the ENERGY STAR label, are now available in a number of major residential and commercial product categories, including computers and other electronic equipment, copiers, washers and dryers, and refrigerators. In addition, ENERGY STAR-labeled products are now available for commercial food service needs, such as commercial refrigerators and fryers, as well as vending machines, water coolers, and exit signs. Many of the energy efficient models are more expensive than standard models, and whether or not they are cost-efficient will depend on the expected intensity of use and other variables.

APPENDIX D

EXHIBIT: SELF-HELP BORROWER UTILITY COSTS

Utility Costs As Percent of Total Business Expenses

Business Type	Estimates?[25]	Percent of Expenses
Auto Repair	Yes	1%
Automotive services	No	5%
Automotive services	No	8%
Beauty Salon	No	11%
Beauty Salon	No	13%
Beauty Salon	Yes	17%
Catering	Yes	4%
Child care	No	1%
Child care	No	4%
Coffee shop	No	6%
Coffee shop/bakery	Yes	4%
Cosmetics	Yes	2%
Fire prevention	Yes	2%
Janitorial service and supplies	No	0.07%
Machine shop	No	4%
Medical Products	No	2%
Restaurant (fast food)	Yes	3%
Supportive housing	No	3%
Tailoring	No	5%
Wrought iron business	No	2%
Total Average		**5%**

[25] "Estimates" include projected energy costs; those not estimated are from tax returns or borrower financials from previous years.

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